Essays on Foreign Direct Investment Institutions Output Efficiency and Economic Growth in Sub-Saharan Africa Countries (SSA)

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SUMMARY

The main motivation of this thesis is to contribute to the literature and deepen our understanding of economic growth in a wide variety of countries. Explaining the course of economic growth and determine factors that might affect it, have been for a long time, and continue to be, one of the most important topics of economic literature. This thesis provides a survey and synthesis of econometric tools that have been employed to study economic growth. While these tools range across a variety of statistical methods, they are united in the common goals of first, contributing to our understanding of the empirical work on economic growth in Sub-Saharan Africa economies. Second, the study quantifies the empirical relationship between Output FDI, institutions, efficiency and productivity and a wide array of factors using data over the last 41years. The first chapter is the introduction; the second chapter is an overview of Sub-Saharan Africa. The empirical analysis of the research can be categorized into three main chapters. In the first chapter (Chapter 3), Complementarity versus Substitutability: FDI and Growth in Sub-Saharan Africa countries are investigated to examine the degree of complementarity between FDI and domestic capital and the level of absorptive capacity of the host countries. In the second chapter (Chapter 4), Output and Institutions are investigated to examine whether institutional development is a determinant of output per worker and productivity growth in Sub-Saharan Africa. The last chapter of empirical analysis (Chapter 5), The Role of Political and Economic Institutions on National efficiency: Evidence from Sub-Saharan Africa, examines the role political and economic institutions play in promoting national efficiency and thus economic development. And Chapter 6 concludes the study.

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Declaration

I hereby declare that this thesis has not been, and will not be, submitted in whole or in part to another university for the award of any other degree.

Lateef Ademola Olatunji

Abbreviations

ADB	African Development Bank
DI	Domestic Investment
EPZ's	Export Processing Zone
FDI	Foreign Direct Investment
FE	Fixed Effect Estimation
GDP	Gross Domestic Production
ICRG	International Country Risk Guide
IMF	International Monetary Fund
LDC's	Less Developing Countries
LSDV	Least Square dummy Variable
M & A	Merger and Acquisition
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Square
POLS	Pooled Ordinary Least Square
R & D	Research and Development
RE	Random Effect Estimator
RGDP	Real Gross Domestic Production
SFA	Stochastic Frontier Analysis
SSA	Sub-Saharan African
TC	Technical Change
TE	Technical efficiency
TFP	Total Factor Productivity
TSLS	Two Stage Least Square
UNCTAD	United Nations Conference on Trade and Development
UNECA	United Nations Economic Commission for Africa, United Nations Education,
UNESCO	Scientific and Cultural Organization
WDI	World Development Indicator
WEO	World Economic Outlook

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CHAPTER 01

INTRODUCTION

The main motivation of this thesis is to contribute to the literature and deepen our understanding of economic growth in Sub-Saharan African countries. Explaining the determinants and the sources of economic growth has been for a long time, and continues to be, one of the most important fields in the literature. The present thesis analyses and examines growth related issues from various aspects emphasising in particular, foreign direct investment (FDI) and Institutions in Sub-Saharan African countries (SSA).

Apart from the relationship between Output and Institutions, the role of trade openness and human capital on growth in developing countries continues to be of considerable theoretical and empirical interest both for researchers and policy makers. A large number of studies have found a positive link between output, institutions, trade and human capital (Easterly and Rebelo, 1993; Barro and Sala-i- Martin, 1995; Islam, 1995; Easterly and Levine, 1997; Collier & Gunning and Ramirez, 2002; Hall and Crowley 2010; Acemoglu Gallego and Robinson, 2014; Christopolous and McAdam, 2015). An important ongoing concern has been why has SSA countries grow slowly and (or) why per capita income remains far below, the level of other countries in the world. This thesis attempts to fill a gap in the literature by providing econometric evidence on these key issues exploring, economic performance of 32 SSA countries from different conceptual angles over the period of 1970-2010.[1]

[1] Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Comoros, Cote d'voire, Ethiopia, Gambia, Ghana, Guinea-Bissau, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Seychelles, Sierra-Leone, South Africa, Swaziland, Togo, Zambia, and Zimbabwe.

The literature on the FDI-growth nexus is vast for both developed and developing countries. The basis of the empirical work on this link focuses on neoclassical and endogenous growth models. It is argued that FDI is an important source of capital deepening, which complements domestic investment, creates new jobs and transfers advanced technology. The diffusion of technological spillovers improves total factor productivity (TFP) and efficiency in less developed countries, which can be a crucial engine of economic growth. The positive effect of FDI on economic performance is often said to depend on the absorptive capacity of the host country (Betstrom et al., 1994; de Mello, 1997; Borenztein et al., 1998; Easterly and Levine, 2002), which is represented by the level of human capital, trade openness, institutional quality, and infrastructure development. Apart from data insufficiency and methodological flaws, the negative relationship found in some studies (Lipsey, 2000: Middendof, 2006) is an unexplored issue. Early cross country studies failed to take into account the continuously changing differences in technology, production and socioeconomic environment, and it have been only recently that empirical studies have made use of panel data to correct the above[2]. The key research question of the first empirical chapter is:-

To examine the degree of complementarity and substitution between FDI and Domestic Capital and its implication for economic growth in SSA

The thesis considers institutional heterogeneity to be an explanation for why countries grow or stagnate. This is in line with recent emphasis on the role of institutions in economic growth[3]; weak institutions seem to be responsible for several economic problems in Sub-Saharan African countries. It is argued that, poor institutional quality is associated with lower investment,

[2]See Bende-Nabende& Ford (1998), Nair-Reichert &Weinhold (2001), Choe (2003).
[3]See Aghion, Alesina &Trebbi (2008), Rodrik, Subramanian &Trebbi (2004), Acemoglu, Johnson & Robinson (2001) and La Porta, Lopez de Silanes, Shleifer &Vishey (1998).

slower productivity growth, and thus lower per capita income. The standard growth models posited that, differences in output per capita can be attributed to differences in physical capital, human capital, and total factor productivity (TFP). The quality of the institutional framework in determining output per capita is a relatively new aspect in the ongoing puzzle of growth determinants. Hall and Jones (1999), Parente and Prescott (2000), Easterly and Levine (2002) and Acemoglu, Naidu, Restrepo and Robinson (2014) argued that the observed differences in output per capita can be partially explained by the role of institutions. This study draws upon Solow (1956) growth model and the subsequent empirical modifications of Mankiw et al. (1992) and Barro and Salai-Martin (1995) but with focus on the role of institutions (Corruption, Government effectiveness, Political stability, Rule of law and Regulatory quality) in explaining differences in productivity across countries. This extension is important for two reasons; first, we analyse the dual character of institutions within a growth model framework, which has been previously neglected for SSA countries. Second, the empirics of long-run economic growth have been based on a cross section regression framework using average data for long periods. This method has limitations as it suffers from the problem of endogeneity. The study employs a panel data approach and the instrumental techniques to overcome these limitations. The key research question of the second empirical chapter is:

To examine whether institutions are determinant of Output per worker and productivity growth in SSA

Many analysts believe that trade liberalization and better political and economic institutions will increase national efficiency and thus promote economic growth (Grossman & Helpman, 1991; Frankel & Romer, 1999; Rodriguez & Rodrik, 2000). Traditional Growth empirics have demonstrated that economic institutions (Trade openness, FDI, Government Size,

Sound money, Regulations, etc.), are the major source of economic growth across countries (Rodrik 2007). These institutions have decisive influence on investments in physical and human capital, infrastructure, technology and thus national efficiency. Trade openness is often considered as a way to increase economic growth. Trade openness may also serve as a conduit for technology and knowledge transfers. Contacts with trade partners or competitors may generate knowledge spillovers into the rest of the economy, for instance, ideas for product differentiation or production design improvements. This leads to the accumulation of knowledge capital (Grossman and Helpman, 1991; Xiaolan Fu, 2006). Again, economic factors play a role in the decision making factors of FDI, due to the fact that economic actors want a return to their investment and profit maximization is a major incentive for investors. However, the influence of political institutions is a key determinant of FDI destinations. In a country with a high level of corruption, high political unrest or instability, non-adherence to rule of law, has more risk and uncertainty, making it less attractive for investors. This is especially important for the present study on SSA countries that are largely characterized by an unstable political environment and incessant strikes that reduce national efficiency. There is little evidence to suggest that efforts to increase either physical or human capital levels in developing countries, especially in Africa, have been successful in generating growth. Easterly (2001), documents how Sub-Saharan African countries had larger increases in schooling than any other region since 1960. Yet these countries remained mired in poverty while Asian 'tigers' like South Korea and Taiwan had smaller increases in education levels but flourished economically. However, recent evidence (Hall, Sobel, and Crowley (2010), Acemoglu, Gallego and Robinson (2014) shows, that investment in physical and human capital can lead to output growth only in countries with good institutions. In countries with bad institutions, increases in capital lead to negative growths because additions to capital stock tend to be employed in other socially unproductive activities. The econometric

analysis from this study shows that political institutions (Corruption, Government effectiveness, Political stability, Rule of law, and Regulatory quality), fundamentally matters for enhancing efficiency and thus economic development of SSA. Therefore, institutions are the fundamental cause of long-run development, working not only through physical capital and TFP but also through human capital (North, 1990; Kaufmann, Kraay & Zoido-Lobatan, 1999; Meon & Sekkat, 2008). The key research question of chapter 3 is:

To examine the Role Political and Economic institutions play in promoting national efficiency and thus economic development in SSA countries.

The first chapter will be the introduction, while the second chapter gives an overview of Sub-Saharan Africa Countries; the empirical analysis of the research can be categorized into three main chapters. In the first empirical chapter (chapter 3), Complementarity versus Substitutability: FDI and Growth in Sub-Saharan Africa is investigated to examine the degree of complementarity or Substitutability between FDI and domestic capital and the level of absorptive capacity of the host countries. We started with a discussion on the neoclassical growth model, Solow growth model and the Endogenous growth model as far as FDI is concerned in achieving long-run growth. The theoretical approach adopted in this study is the Endogenous growth model. We then apply the panel data techniques with annual data for 32 SSA countries. In the second chapter empirical (chapter 4), Output and Institutions are investigated to examine whether institutional development is a determinant of output per worker and productivity growth in these countries. We started with the survey of key literature on Output and Institutions. The theoretical approach adopted in this study is the structural model of output per worker augmented with Human capital and Institution. The estimation is performed using the panel data techniques with annual data for 32 Sub-Saharan Africa countries. To complement the analysis and provide a robustness check,

we introduce the instrumental techniques to control for endogeneity. The last chapter of empirical analysis (chapter 5), The Role of Political and Economic Institutions on National efficiency: Evidence from Sub-Saharan Africa (SSA), examines the role political and economic institutions play in promoting national efficiency and thus economic development. We started with a survey of key literature on political and economic institutions. The model adopted in the study is the stochastic frontier model. The econometric estimation is performed using stochastic frontier analysis. And chapter 6 concludes the study.

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CHAPTER 02

Overview of Sub-Saharan Africa Countries

Sub-Saharan Africa is geographically, the area of the continent of Africa that lies South of Sahara Desert. Politically, it consists of all African countries that are fully or partially located south of the Sahara (excluding Sudan), even though Sudan sits in the Eastern portion of the Sahara desert. (See Figure 2:1). SSA comprises 49 of Africa's 54 countries[4]. Therefore, it refers to all Africa except the five predominantly Arab states of North Africa (Algeria, Egypt, Libya, Morocco and Tunisia). In terms of population; SSA is the most populous regional economic community in Africa with a population estimated at 845 million in 2010, which grows at a rate of 2.67% per annum. Nigeria is the most populous country with a population estimated at 162 million (19.19% of the region). It is followed by Congo whose population is estimated at 70.9 million (8.39%). The least populated country of SSA is Seychelles which has a population estimated at 0.088 million (1.04%). (See Appendix, Table 2: 1).

[4] Angola; Benin; Botswana; Burkina Faso; Burundi; Cameroon; Central Africa Republic; Comoros; Cape Verde; Chad; Cote d' Voire; Congo; Democratic Republic of Congo; Djibouti; Ethiopia; Equatorial, Eritrea, Guinea; Gabon; Gambia; Ghana; Guinea Bissau; Guinea; Kenya; Lesotho; Liberia; Madagascar; Malawi; Mali; Mauritania; Mauritius; Mozambique; Namibia; Niger; Nigeria; Rwanda; Sao Tome and Principe; Seychelles; Somalia; South Africa; Swaziland; Senegal; Sierra Leone; Tanzania; Togo; Uganda; Zambia; Zaire; Zimbabwe.

Figure 2.1:

Regarding the structure of the regional economy, agriculture still remains the backbone of the economy of SSA. From UNCTAD (2010), statistics the primary sector which involves mainly agricultural activity accounted for 40% of the GDP of the region, whilst the secondary and tertiary sectors accounted for 25% and 35% respectively. The Sub-Saharan economy is essentially grounded in four pillars; (a) Oil and mining sector with limited local content, (b) Agriculture and agro-allied business sector below potential. (c) Under-developed manufacturing and services sector. (d) Large and dynamic, informal sector.

Despite some success stories in 1960s and early 1970s, Africa is poor and getting poorer. On average, real per capita GDP did not grow in Africa over the 1965-1990 period, while, in East Asia and the pacific, per capita GDP growth was over five percent and Latin America grew at almost two percent per year (Easterly and Levine, 1997). The average country in SSA is poorer than the average low-income country, indeed the average growth rate has been negative since

1965 and there is approximately a 35-fold difference between the per-capita income level of such a country and US (Acemoglu, Johnson, and Robinson, 2001). The analytical work on this poor performance has been hinged on scant constraints on executive power and long term democratic stability is under threat (Collier and Hoeffler, 2004), poor economic and social indicators such as low economic growth, high inflation, and high infant mortality (Fearon and Laitin, 2003) and weak governance and institutions and high level of corruption (Ali et al., 2010; Jakobsen, De Soysa, and Jakobsen, (2013). Against this background of poor performance, there are some SSA countries that have performed well, even better than some developed countries. Appendix Table 2.2 attempt to provide some insight into individual country performances by showing SSA in comparative perspective, it is evident Southern part of Africa (e.g. Botswana Mauritius, Seychelles, Swaziland) have performed well than West Africa (e.g. Benin, Burkina-Faso, Coted'voire, Guinea-Bissau, Mali, Niger, Nigeria, and Togo) and Eastern Africa countries (e.g. Burundi, Comoros, Central African Republic, Rwanda, Zambia and Zimbabwe). Again the life expectancy of these countries is better than other countries in the region. The performance of the Southern-part of this economy is worthy of mention. First, a number of these economies have adopted open trade and have out-performed the rest of Africa by a wide margin, these have been linked to their success in export processing industries, especially sugar, textiles and apparel. This is consistent with the findings in Sachs and Warner, (1997). Second, it is true that diamonds, uranium and agricultural exports have been important for the growth of these countries, for instance, Namibia is among the top twenty mining countries in the world, with diamonds and uranium being the leading commodities (UNCTAD, 2010). Again, diamonds have been important for growth in Botswana, and currently account for around 40percent of the country's output[5] and also the study by Henry, Kneller and Milner (2009), on 57 developing countries for

[5] See Acemoglu 2001.

the period 1970-1998, finds Mauritius among the 10 most efficient countries in the sample in 1995. Yet, in many other countries in the region (Ghana, Nigeria, Niger, Sierra Leone), natural resource abundance appears to be a curse rather than a blessing[6]. There is almost complete consensus that the southern part of SSA has achieved rapid growth because it managed to adopt good policies and there were no civil wars or intense infighting to control the revenues from their natural resources. The basic system of law and contract worked reasonably well, the government sustained the minimal public service structure that it inherited from the British and developed it into a meritocratic, relatively non-corrupt and efficient bureaucracy.

Table 2.3: Economic Indicators: GDP per capita, (PPP), US Dollars 2014.

	South Asia		Latin America		Sub-Saharan Africa	
1	Afghanistan	1,946.2	Brazil	15,153.31	Benin	1,873.76
2	Bangladesh	3385.50	Mexico	17,925.11	Malawi	781.36
3	Bhutan	7,656.96	Colombia	13,458.84	Burundi	912.49
4	India	5,777.02	Argentina	22,101.30	Cameroon	2,981.95
5	Laos	4,998.56	Bolivia	6,222.43	CAR	608.47
6	Nepal	2,380.67	Venezuela	17,917.17	Comoros	1,673.71
7	Srilanka	10,355.2	Chile	23,165.11	Cote d'voire	2,902.36
8	Vietnam	5621.41	Guatemala	7,476.93	Ethiopia	1,532.54
9	Pakistan	4746.41	Ecuador	11,352.41	Gambia	1,744.53
10	Indonesia	10, 156.71	Costa-Rica	14,914.40	Ghana	4,172.68
11	Malaysia	24,520.78	Dominican Republic	12,803.27	Guinea Bissau	1,439.88
12	Cambodia	3281.57	Honduras	4712.71	Kenya	3,138.11
13	Thailand	14,442.64	Paraguay	8,385.54	Lesotho	2,925.12
14			Nicaragua	4,797.02	Mozambique	1,123.29
15			Elsavado	8,014.18	Mauritania	3,379.21
16					Nigeria	6,081.67
17					Senegal	2,316.30

Source: World Economic Outlook (IMF), 2015

[6] See e.g., Sachs and Warner, 1995

Table 2.3 shows per capita income between these three regions (South Asia, Latin America and Sub-Saharan Africa). In per capita terms, the contrast in economic performance between these three regions is even greater.

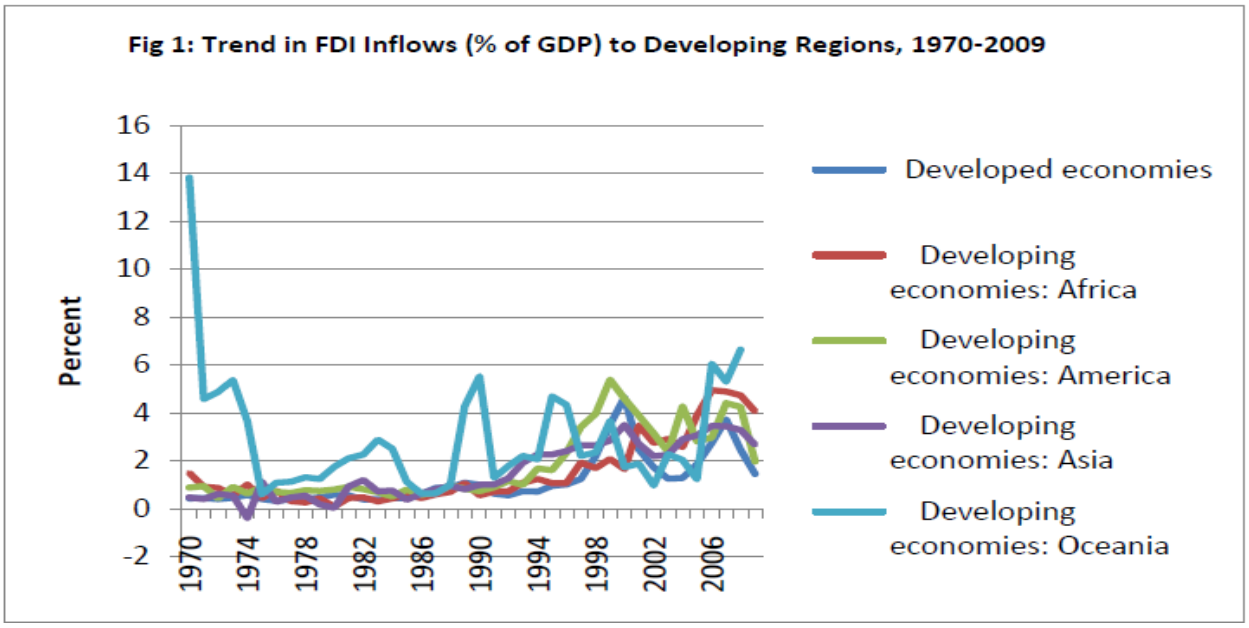
In the 1960's South Asians were on the average much poorer than the Africans, but by 2005 they were almost two and half times richer (World Bank, 2009a). Higher per capita in South east Asia has entailed substantial reductions in poverty. The proportion of the regional population living on one US dollar per day (calculated at Purchasing Power Parity) fell by more than two-thirds between 1980 and 2003 (World Bank, 2009b). In contrast, poverty levels have remained high and rising. It is interesting to note that the high growth of per capita income of these countries was due entirely to higher capital accumulation and human capital (Loayza, Fajnzlber, and Calderon, 2005). The poor economic performance of Sub-Saharan economies compared with performance in other regions (Latin America and South Asia), it's frustrating and contradicted the explanations offered by the growth literature. This present study will offer explanation for slow growth in Sub-Saharan African countries with the newly assembled data set.

In last the decade all the countries in SSA have faced problems in their macroeconomic environments that had a significant impact on manufacturing sector performance. They had all adopted import substitution development policies from independence through the late 1970s. In the mid to late 1980s, they had all introduced "structural adjustment" programs with the support of the World Bank and other aid organizations, with emphasis on macroeconomic reforms, trade liberalization and privatization[7]. With an increasing pace of globalization that resulted partly from liberalization of trade and exchange rate regimes, most of these economies have resulted to different measures to attract foreign direct investment (FDI), which is an important element in

[7] The scope and success of these programs varied (see Bigsten et al, 1999a, 199b).

solving the problem of scarce local capital and low productivity. However, it was only in the 1990s that many SSA countries actively began to persuade foreign investors to invest their money and expertise in their countries. Foreign investment flows were very small relative to other developing countries, even where a political climate was favourable, partly because of the mismatch between development goals of the host countries and the goal of the foreign investors.

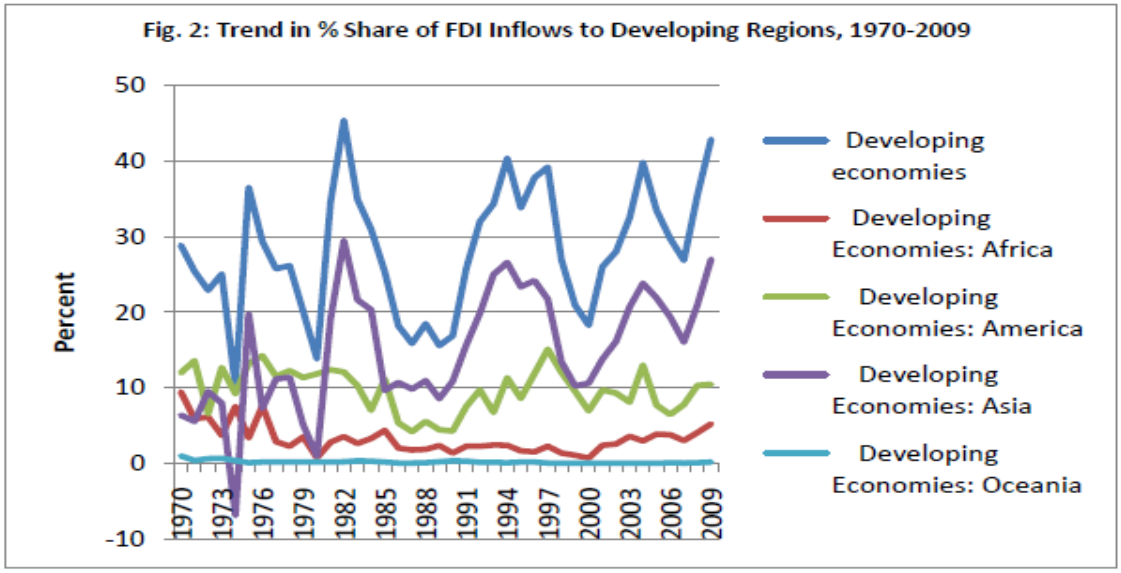
Figure 2.2:



Source: UNCTAD, FDI/TNC Data Base, 2012 (www.unctad.org/Fdistatistics)

The FDI as percentage of GDP (see Figure 2.2) show, Africa has never been major recipients of FDI flows and lag behind other regions of the world. After reaching a low on the average during the 1970s and 1980s, FDI as percentage of GDP improved continuously since the mid-1990s to reach an average level of 2.2 percent over 2000 demonstrating a more pronounced role for FDI on African continent. By 1990, Africa's share was a mere 1.37 percent compared to Asia's 10.9 percent and by 2009 while Africa's share was just 5.27 percent, Asia received a whopping 27 percent (see Figure 2.3), this stagnation is the result of poor economic and political uncertainty in Cote' d'voire, Egypt, Libya, Nigeria, Niger, Zambia and a host of other African countries.

Figure 2.3:



Source: UNCTAD, FDI/TNC Data Base, 2012 (www.unctad.org/Fdistatistics)

Sub-Saharan Africa can generate sustained, rapid growth into the future with the following four options. First is to revive manufacturing industries and put industrialization back on track, so as to replicate as much as possible the traditional routes to convergence. Second, they need to generate agriculture-led growth, based on diversification into non-traditional agricultural products. Third is the growth based on natural resources, in which many African countries are endowed and lastly, there is almost complete agreement that "poor business climate" and "poor institutions" has served as a deterrent to the rapid growth of Sub-Saharan Africa[8]. All these raise the costs of doing business with SSA for an investor interested in starting or expanding a manufacturing operation.

[8]*Gelb, Meyer, and Ramachandran (2014), for example, cites costs of power, transport, corruption, regulations, security, contract enforcement, and policy uncertainty, among other impediments.*

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UNCTAD (2012), FDI/TNC Database (www.unctad.org/Fdistatistics

Appendix:

Table2.1: Sub-Saharan African Countries GDP Per-capita (USD) (2009-2011)

Countries	Population	2009	2010	2011
Comoros	773,407	788	817	902
Djibouti	740,528	**N/A**	**N/A**	**N/A**
Ethiopia	88,013,491	418	350	359
Kenya	40,046,566	842	808	850
Seychelles	88,340	**N/A**	**N/A**	**N/A**
Somalia	10,112,453	**N/A**	**N/A**	**N/A**
Sudan	41,980,182	**N/A**	**N/A**	**N/A**
Tanzania	41,892,895	547	547	553
Uganda	33,398,682	472	506	477
Chad	10,543,464	699	837	891
WEST AFRICAN SUB REGION				
Benin	9,056,010	765	681	736
Chad	**N/A**	699	837	891
Gambia	1,824,158	434	550	543
Ghana	24,339,838	**N/A**	**N/A**	**N/A**
Guinea	10,324,025	418	477	492
Guinea Bissau	1,565,126	244	508	575
Ivory Coast	21,058,798	1,071	1,042	1,062
Liberia	3,685,076	210	261	297
Mali	13,796,254	641	614	668
Mauritania	1,294,104	1,044	1,140	1,190
Nigeria	162,217,341	**N/A**	**N/A**	**N/A**
Senegal	14,086,163	984	981	1,075
Sierra Leone	5,245,695	342	325	366
Togo	6,019,877	408	459	505
Burkina Faso	16,241,811	452	609	663
Niger	16,878,270	375	370	399
CENTRAL AFRICA SUB REGION				

Angola	13,068,161	**N/A**	**N/A**	**N/A**
Burundi	9,863,117	174	245	279
Cameron	19,294,149	1,095	1,100	1,230
Central Africa rep	4,844,927	446	428	456
Congo	70,916,439	300	185	215
Rwanda	11,055,976	512	557	605
Congo Brazzaville	4,125,916	**N/A**	**N/A**	**N/A**
SOUTH AFRICA SUB REGION				
Botswana	2,029,876	**N/A**	**N/A**	**N/A**
Lesotho	1,919,552	**N/A**	**N/A**	**N/A**
Madagascar	20,653,556	432	410	458
Malawi	15,447,500	352	343	350
Mauritius	1,284,264	1,044	1,140	1,290
Mozambique	22,061,450	456	439	582
Namibia	2,128,470	N/A	N/A	N/A
Swaziland	1,354,051	N/A	N/A	N/A
Zambia	12,056,923	1,022	1,221	1,413
Zimbabwe	11,651,858	303	591	741
Equatorial Genuine	650,702	**N/A**	**N/A**	**N/A**
Eritrea	5,792,984	328	397	475
Sao Tome & Principle	212,679	**N/A**	**N/A**	**N/A**
South Africa	49,109,107	**N/A**	**N/A**	**N/A**
Total	855,513,832	18,317	19,775	21,588

Sources: UNCTAD 2012

Table 2.2Sub-Saharan African Countries in Comparative Perspective (1970-2010)

Countries	GDP per capita	GDP growth per capita	Life expectancy at Birth
Benin	331.59	0.67	49
Botswana	2229.55	6.24	57
Burkina Faso	186.85	1.61	48
Burundi	153.00	0.38	46
Cameroon	629.81	1.08	51
Central African Republic	284.36	-0.86	46
Comoros	384.65	-	55
Cote' d'voire	736.25	-0.70	51
Ethiopia	140.56	1.88	48
Gambia	593.29	0.72	51
Ghana	256.10	0.65	56
Guinea-Bissau	186.66	0.13	43
Kenya	416.26	1.05	56
Lesotho	330.39	2.72	52
Madagascar	296.25	-1.22	54
Malawi	148.15	1.11	46
Mali	206.83	1.36	43
Mauritania	530.26	0.28	54
Mauritius	2782.74	3.52	69
Mozambique	224.46	2.42	44
Namibia	2186.44	0.68	58
Niger	206.60	-1.13	44
Nigeria	386.31	1.8	46
Rwanda	243.62	1.91	43
Senegal	506.49	0.22	51
Seychelles	5503.27	3.31	64
Sierra-Leone	201.01	0.32	41
South Africa	3379.86	0.57	56
Togo	282.58	-0.14	51

Swaziland	1175.41	2.99	53
Zambia	421.73	-0.58	48
Zimbabwe	487.8	-0.50	54

SOURCE: World Bank, Development indicators.

CHAPTER 03

Complementarity versus Substitutability: FDI and Growth in Sub-Saharan Africa (SSA)

3.1: Introduction

Capital is a vital ingredient for economic growth, but since most nations cannot meet their total capital requirements from natural resources alone, they turn to foreign investors to supply capital. Foreign direct investment (FDI) and foreign portfolio investment (FPI) are two of the most common routes for overseas investors to invest in an economy. FDI is the investment by foreign investors directly in the productive assets of another nation while FPI is investment in financial assets such as stocks and bonds of entities located in another country.[9]

Multinational corporations (MNCs) can undertake FDI between building its own establishment (Greenfield investment) or to acquire an existing firm (cross-border M&As) (Nocke and Yeaple, 2007). The two forms of investment are different in nature (Wang and Wong, 2009). Economic studies suggest that Greenfield FDI and M&As may have different economic consequences in the host country. Blonigen and Slaughter (2001) find that Greenfield manufacturing FDI does not contribute to U.S. within industry skill-upgrading. Liu and Zhou (2008) find that greenfield FDI in Chinese high-technology industry is associated with both intra-industry spillovers and M&As only exhibit inter-industry spillovers. Wang and Wong (2009) show that Greenfield FDI improves economic growth while M&As have negative effects on the host country's economic growth.

[9] See OECD Benchmark Definition of foreign Direct Investment, Fourth edition 2008, for a comprehensive review.

However, FDI is obviously the route preferred by most nations for attracting foreign investments, since it is more stable than FPI and signals long-lasting commitment to an economy. Again, FDI investors typically take controlling positions in the domestic firms or joint ventures, and are actively involved in their management.[10] FPI investors, on the other hand, are generally passive investors who are actively involved in the daily operations and strategic plans of domestic companies.

3.2: Impacts of FDI on Economic Growth in the Host Country

The role of foreign direct investment (FDI) in stimulating economic growth is one of the most controversial issues in the literature on development economics. In a standard Solow- type growth model, FDI enables host countries to achieve investment that exceeds their own domestic saving and thus increases capital formation. The basic shortcomings of conventional neo-classical

Growth models, as far as FDI is concerned, is that long-run growth can only result from technological progress and (or) labour force growth, which are both considered to be exogenous. FDI would only affect output growth in the short-run while in the long-run, under the conventional assumption of diminishing returns to capital, the recipient economy would converge to its steady state, leaving no permanent impact on output growth (de Mello 1996, 1997, 1999), Hanson (2001), Carkovic and Levine (2003), Gorg and Greenway (2004).

Another strand of the growth literature Romer (1990), Grossman and Helpman (1991), Aghion and Howitt (1992), Alfaro et al.,(2004), Chowdhury and Mavrotas (2005) and Ozturk

[10] IMF guidelines consider an investment to be a foreign direct investment if it accounts for at least 10 percent of of the foreign firms voting stock of shares. However, many countries set a higher threshold because 10 percent is often not enough to establish effective management control of a company or demonstrate an investor's lasting interest.

(2007). Endogenise the rate of technical change to emphasize the role of knowledge spillovers generated from FDI and R&D. Under this consideration, FDI can be a substantial conduit for the transmission of new ideas, technological know-how and advanced managerial practices. More recent empirical studies Islam (1995), Bende-Nabende& ford (1998),Choe(2003), Li and Liu, (2005), Jude &Levieuge (2013) and Bashir et al.,(2014)make use of panel data to correct for continuously evolving country-specific differences in technology and educational attainment, thus eliminating many of the difficulties encountered in cross-country estimations (e.g., Chowdhury &Mavrotas (2005); Yousaf et al.,(2008); Olayiwola & Okodua (2013)).

For FDI related spillovers to be an effective engine of growth for the domestic economy, MNCs needs to maintain a certain level of embeddedness with the local economy (Phelps et al., 2003 a Wren, 2006; Bashir et al, (2014)), in other words, embeddedness is required in order for MNCs to build up networks with local firms and thus making possible for the diffusion of knowledge spillovers.[11] The present study seeks to overcome the data problem of the existing literature using a newly assembled data set, which assess the effects of FDI in 32 Sub-Saharan African countries, henceforth (SSA), within an endogenous growth framework

The diffusion of technologies had a major role in the spillover process from foreign firms with superior knowledge to that of domestic firms (Borensztein et al., 1998; Benhabib and Spiegel 1994; Jude and Levieuge 2013) and therefore, plays a central role in the technological and economic progress of developing countries (Jovanovic& Rob, 1989, Borensztein et al., 1998). The primary creation of knowledge is thereby mostly in the hands of foreign activity, but local

[11] The notion of embeddedness implies that inward FDI in developing countries should carry certain characteristics that are highly correlated with high value added activities. The FDI-growth nexus is better promoted if MNCs are export-oriented; invest in R&D and tangible assets etc. Certainly, integration between local firms and MNCs can be achieved more effectively if local economy has the appropriate institutional framework as well as there is enough productive capacity to absorb knowledge spillovers from FDI.

economy needs to prove they have sufficient ability to imitate and absorbFDI induced technological advancements.

Given that FDI is directly associated with technological diffusion (Grossman and Helpman, 1991; Barro and Sala-i-Martin, 1994; Phelps, 1996), growth process in developing countries can be partly explained by a "catch-up" process. As already implied above, the rate of economic growth of a backward country depends on its ability to implement technologies that are already in use in leading countries (Borensztein et al., 1995). On this basis, FDI is considered to be a major channel of the catch-up process between backward and leading countries.

The neo-classical Solow growth model predicts that the elasticity of output with respect to capital should be equal to the share of capital in total output, nevertheless cross-sectional estimates point out a much higher value. Recently, those high estimates have been interpreted as evidence of the importance of endogenous growth (Romer,1990), and explained on the grounds that capital should be understood in a broad sense as it incorporates additional inputs (for instance human capital and R&D spending) that eliminate the assumption of diminishing returns (Mankiw, Romer and Weil, 1992). [12] In other words, high capital elasticities incorporate externalities from those additional inputs (Benhabib and Jovanovic, 1991; Benhabib and Spiegel, 1994). On that basis, FDI-related externalities can be shown to produce the higher capital elasticity in growth accounting equations.

The subject of FDI related spillovers in growth is of vital importance for the developing world, but the empirical evidence is rare-at least- within an African context. Additionally, some new theoretical insights are also valuable for empirical analysis of the issue are needed as well as

[12] This also refers to as embodied technical change in capital inputs.

for a better understanding of the link between FDI and economic growth. The existing FDI literature for African economies (Odozi, 1995; Oyinlola, 1995; Adelegan, 2000; Asiedu, 2001; Akinlo, 2004; and Ayanwale, 2007) mainly relies on cross-sectional evidence without addressing time variation in the data. Our study overcomes this gap with a cross-section time series data set of 32 countries over a period 41 years.

According to the endogenous growth model, investment in physical and human capital, greater export orientation and faster population growth should lead to permanent changes in economic growth. The growth process is also subject to changes in the policy spectrum, such as government consumption, infrastructural development and domestic capital.[13]FDI is expected to impact on economic growth through two channels: First, it increases the available capital stock and thus improves the degree of capital deepening in the recipient country (de Mello 1999; Dunning 1993; Blomstrom et al., 1996; Borensztein et al., 1998). Second, the transfer of modern technology and Know-how is another potential benefit associated with the inflow of FDI into an economy. FDI is incorporated by large transnational corporations which are some of the most technologically advanced firms and carry out most of the research and development activity globally (Borensztein, De Gregorio and Lee, 1998). The immediate benefit is ascertainable on the level of individual enterprises but the existence of spillover effects "suggests that FDI affects growth endogenously through increasing returns generated in interaction between local firms and foreign affiliate" (Wang and Blomstom, 1992).

[13] In addition the quality of institutions in a country influences its ability to ensure economic growth and improve the quality the quality of life of its population. Therefore the growth process of a country will depend on several institutional indicators such as property rights, governance, political stability, legal systems and control of corruption (see, Hall and Jones 1999, and Acemoglu et al., 2001).

The above considerations suggest that FDI gains are conditional to the degree of complementarity between FDI and domestic production (Balasubramanyam et al., 1996). The two competing hypotheses are whether FDI crowds out or in domestic investment.[14]Agosin and Mayer (2000) argued that FDI and domestic investment are likely to be complementary when the investment is in an undeveloped sector of the economy (due to technological factors or to the lack of knowledge of foreign markets). On the other hand, FDI is more likely to substitute for domestic investment when it takes place in sectors, where there exist plenty of domestic firms. Again Yousaf et al., (2008), find a positive relationship of FDI with imports and exports in the long-run economic growth in Pakistan and argued that there is complementarity between foreign trade and FDI.

We aim to contribute to the existing literature in three dimensions. Firstly, the study uses a larger cross country (32 countries) sample over a longer time period (1970-2010). Second, interactions of FDI with human capital, infrastructure and trade openness are introduced to examine whether FDI affects growth by itself or through the interaction term. Finally, the study focused on the additional question of whether the impact of FDI varies between economies, which are mineral-rich versus those who are not, since many countries in the Sub-Saharan Africa region might attract FDI flows in the primary sector, due to the abundance of mineral and natural resources.

[14] Tang et al., (2008) find FDI to be complementary to domestic investment contributing to the shortage of domestic capital leading to beneficiaries' results for economic growth in China.

The main focus of this chapter is to:

- Examine the degree of complementarity and substitution between FDI and Domestic capital. For FDI to affect growth positively, it may be argued that it requires some degree of complementarity with domestic investment.
- Examine the absorptive capacity of the SSA countries. Foreign direct investment contributes to economic growth only when a sufficient absorptive capacity of the advanced technologies is available in the host economy.

The rest of the study is organized as follows: Section 2 presents the analytical framework. Section 3 discusses the data set used in the empirical analysis. Section 4 outlines the methodology upon which the study is based and the results of the empirical analysis. The last section contains the concluding remarks.

3.2: Theoretical Underpinnings

We depart from a growth accounting approach,[15] and then we augment the aggregate production function with ancillary variables (i.e. Trade measure, economic stability, government size, infrastructure facilities, institutional dummies,). An aggregate production function of two inputs is written as:

$$Y = Af(H, L) \tag{3.1}$$

Where Y is the output, A is an efficiency parameter, L and H is the overall total capital endowment in the recipient economy.

Therefore, $$H = (K_{D,} K_F) \tag{3.2}$$

[15] See Solow (1957) and Denison (1962, 1967).

We can think the overall total capital endowment as domestic (K_D) or foreign-owned (K_F), as a consequence of FDI. FDI affect's growth directly, by increasing the stock of physical in the recipient economy, as K_F is accumulated, and indirectly, by inducing human capital development and promoting technological upgrading.

The specific Cobb-Douglas production function for, the recipient economy in per capita terms for each time period is given as

$$y = Af(h) \tag{3.3}$$

$$h = (k_d k_f^{\alpha})^{\eta} \tag{3.4}$$

We assume that $\alpha > 0$ which means, increases in FDI stocks yields positive externalities to the host economy.

$$if\ \eta > 0, \text{ then } \frac{1}{k_d^n} < \frac{1}{k_f^{\alpha\eta}} \tag{3.5}$$

From equation (3.5), foreign capital, crowds in domestic investment and complementarity exits between FDI and domestic Capital

$$if\ \eta < 0, \text{ then } \frac{1}{k_d^{\eta}} > \frac{1}{k_f^{\alpha\eta}} \tag{3.6}$$

From equation (3.6), foreign capital, crowds out domestic capital, decreasing growth

The degree of complementarity or substitution between foreign capital and domestic investment is shown to affect output growth in theoretical models (given parameters α and η in equation (3.5) and (3.6). Under complementarity, innovations embodied in foreign investment may create, rather than reduce, rents accruing to older technologies (Young, 1993). Also, if FDI contributes to faster growth, it is likely to require some degree of complementarity with domestic

investment rather than substitution, given that the existing factor endowments in the host country act as an FDI determinant.

By combining equations (3.3) and (3.4), we obtain:

$$y = Ak_d^{\eta(1-\beta)}k_f^{\alpha\eta(1-\beta)} \tag{3.7}$$

Taking the logarithms and differentiating with respect to time equation (3.7) gives,

$$\frac{I}{Y}\frac{dY}{dt} = \frac{I}{A}\frac{dA}{dt} + \left[n(1-\beta)\right]\frac{I}{k_d}\frac{dk_d}{dt} + \alpha\eta(1-\beta)\frac{dk_f}{dt} \tag{3.8}$$

From equation (3.8), we can derive a general growth accounting equation as:

$$g_y = g_A + \left[\eta(1-\beta)\right]g_d + \left[\alpha\eta(1-\beta)\right]gf \tag{3.9}$$

Where is g_y real per capita GDP growth, g_d is the growth rate of the domestic capital stock and g_y is the growth rate of the foreign-owned capital stock. Again, g_A denotes TFP growth. Equation (3.9) can be expanded to incorporate a set of control and policy variables that are generally included in growth models as potential determinants. These control variables include, government consumption (as a percentage of GDP) of the country, human capital, infrastructure, inflation trade openness, etc. Grossman and Helpman (1990), and Rodrik (1992) have pointed out that trade can potentially create both growth-accelerating and growth-decelerating forces.

Kowalski (2000) argues that inflation determines steadiness of the economy of the country. If the inflation rate is high, it could be an escalating problem for the economy. We expect a negative correlation of this variable with our dependent variable, in line with the literature.

3.3: Data

3.3.1: General Description

Data on GDP per capita and capital stock were taken from World Bank's Development Indicators (WBDI). Data are expressed in constant 2000 USD. We capture absorptive capacity of Sub-Saharan African countries using capital stock measured as gross fixed capital formation (GFCF) as a percentage of GDP. Capital goods imports embody knowledge of foreign technology and production know-how; the greater these imports the greater the scope for direct absorption of foreign innovation by the importing firms and for spillovers of this knowledge to other firms (Henry, Kneller and Milner, 2009; Griffith et al., 2005). The major source of this capital stock is FDI. Policy makers believe that FDI is an important element in the growth process of developing economies (Bwayla, 2006). FDI data are taken from various issues of the World Bank, Development Indicators, International Monetary Fund and International Financial Statistics. Human capital is measured by mean years of schooling in the population aged 15 and over is taken from Barro and Lee (2000). Trade openness is the share of exports plus imports to GDP (WBDI and ADB databases). Inflation variable reflects the annual percentage of the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The data were taken from World Bank Development Indicators. And Finally the Infrastructure variable measures the number of telephone lines per 1000 population and the series is taken from World Bank Development Indicators. For the period 1970-1979, series have missing values for most of SSA countries. Our complementary sources included the United Nations' National Accounts Main Aggregates Database, the IMF's World Economic Outlook (WEO) and Statistical Bulletin of Central Bank of SSA countries. The initial panel includes 48 Sub-Saharan African countries covering the period 1970-2010, data for the

period 1970-1979 are scarce for some of the countries and we decided to drop them to avoid issues of outliers that will bias our results. The final format of our annual data is an unbalanced panel of 32 countries for the period 1970-2010.

3.3.2: Definition of Variables.

Since the study is to examine the effect of FDI on economic growth of Sub-Saharan African countries, the variables that are important determinant of economic growth will be included in our model (see Appendix: Table 3.1), for the list of variables, description and data source. The dependent variable used is the GDP per capital growth, which is obtained as a ratio of real GDP to the population growth. The figures for this were constructed using World Development Indicators (WDI). This is following after de Mello (1996, 1997 and 1999), Borensztein et al., (1998) and Benhabib and Spiegel (1994).

The independent variables included in the model are:

Foreign direct investment: Foreign direct investment is represented by FDI net inflows as percentage of GDP and FDI inflow per worker. Previous studies have used use one or more of the above measures in order to determine the impact of FDI on economic growth. Ram and Zhang (2002) introduce three variations of the measure in their model, and find that they yield similar results. I introduce the variations of this variable, and find that they yield similar results.

Domestic Capital: Proxy by investment (gross capital formation). Domestic capital is included in our model to determine the extent to which FDI complements domestic capital. Previous studies have shown that FDI will serve as an engine of growth if it complements domestic capital (de

Mello, 1999, and Borensztein et al., 1998). We have used Gross capital formation as a percentage of GDP.

Manufacturing value added: Manufacturing value added as a percentage ratio of GDP is used as a proxy for learning by doing. Romer (1986), Stokey (1991) and Grossman and Helpman (1990) emphasized that learning by doing can have a positive effect on growth during economic transition, as well as in the long-term. I have used this variable to determine the contribution of the manufacturing sector to the overall economy of Sub-Saharan African economy.

Human Capital: In endogenous growth theory, human capital has been recognized as an essential determinant of economic growth. Mankiw et al. (1992), Akinlo (2004), Barro and Sala-i-Martin (2004), and Benhabib and Spiegel (1994) have long stressed the importance of human capital to growth in both developed and developing countries. I have used the Secondary school enrolment as a proxy for human capital.

Inflation: Inflation rate is included as a measure of overall economic stability of the country. Macroeconomic stability is one important determinant of economic growth. We expect an indirect relation between inflation and economic growth. In studies by Tobin (1965), Stockman (1981), Friedman (1977) and Jones and Manuelli (1995), the inflation rate was used as an indicator of macroeconomic stability.

Infrastructure development: Good infrastructure facilitates production, reduces operating costs and thereby promotes FDI (Wheeler and Mody, 1992). Infrastructure increases the productivity of investments and therefore stimulates FDI flows. As is standard in the literature, I use the number of telephone lines per 1,000 populations to measure infrastructure development.

Openness: In the literature, the ratio of trade (imports, exports) to GDP is often used as a measure of openness of an economy (Asiedu, 2002; Ayanwale, 2007). This ratio is also often interpreted as a measure of trade restrictions. In the growth accounting literature exports have been considered as an explanatory variable. FDI inflows are expected to result in improved competitiveness of host country's exports. As exports and investments may also generate foreign exchange that can be used to import capital goods. We expect a direct relationship between this variable and economic growth.

Government size: This is measured as the ratio of government consumption to GDP. It is expected to bear a direct relationship to economic growth. This is because a higher level of government consumption should translate into provision of more social capital that should encourage production and growth.

Table 3.2: Summary statistics of included variables: Sample 32 Countries (1970-2010)

Variable	Observations	Mean	Std. Deviation	Minimum	Maximum
GDP per capita	1312	3.83	3.90	0.0002	47.28
Capital	1312	18.66	8.81	2.0004	76.69
FDI	1312	5.42	8.28	$6.90e^{-07}$	111.80
MVA	1312	11.97	7.01	0.3640	62.82
Human capital	1310	2.96	3.89	0.0234	30.12
Inflation rate	1312	11.45	12.31	0.0123	83.32
Infrastructure	1312	3.74	5.71	0.0320	31.22
Trade	1312	0.73	0.50	0.0028	3.25
Government	1311	14.38	7.21	0.0093	64.39

Source: World Bank's World Development Indicators and Author's calculations

Table 3.2 presents the summary of descriptive statistics using data averaged over 1970-2010. There are considerable cross-country variations in the data. For instance the mean per capita growth for the sample is 3.83% and the standard deviation is 3.90%.The mean FDI net inflows in percentage of GDP is 5.42% and standard deviation of 8.28% this represents a very low FDI inflows as percentage of GDP in Sub-Saharan Africa economy.

Botswana and Nigeria enjoyed the maximum growth 7% and 7.1%, while Burundi, Burkina-Faso and Comoros had the lowest average growth of 0.3%, 1.5% and 1.5% respectively over the period (see Tables, 3.4a and 3.4b)

Table 3.3, shows the breakdown of Sub-Saharan African countries into mineral-rich and mineral-poor. The definition of mineral-rich is taken from Nijkam (2008) and supplemented with data from Pinkovskiy and Sala-i-Martin (2010). To confirm the authors' classification, I construct a mineral-richness index defined as follows:

$$\min eralrichness = \frac{fuel\exp orts + \min eral\exp orts}{manufacturing\exp orts + agriculture\exp orts + food\exp orts}$$

The index is greater than 1 when fuel and mineral exports exceed other exports, and less than or equal to one otherwise. I classify countries as mineral-rich if the index is greater than 1 and mineral-poor if the index is less than 1. Using averaged export data from 1970 to 2010, I find this classification to be generally the same as Pinkovskiy and Sala-i-Martin's in the instances where the exports data are available, and thus proceed with their classifications. Table 3.3 lists all the countries of my sample and their classification into the two groups

Table 3.3 Classification of countries in Sub-Saharan African

Mineral-Rich economies		*Mineral-poor economies*	
Botswana	Niger	Benin	Malawi
Cameroon	Nigeria	Burkina Faso	Mali
Central Africa Rep.	Sierra Leone	Burundi	Mauritius
Mauritania	South Africa	Comoros	Mozambique
Lesotho	Zambia	Cote d'voire	Rwanda
Namibia		Ethiopia	Senegal
		Gambia	Seychelles
		Ghana	Swaziland
		Guinea-Bissau	Togo
		Kenya	Zimbabwe

Source: Pinkovskiy and Sala-i-Martin (2010)

Table 3.4a and 3.4b, shows the comparative analysis of FDI net inflows in percentage of GDP and Real GDP per capita growth in mineral-rich and mineral poor countries and growth seems to correlate positively with FDI, for all the countries. Table 3.4a shows that mineral rich countries have a higher growth rate than the mineral poor countries; one of the factors contributing to growth in many of these countries has been the continuous increased prices of commodities, particularly oil prices.

Table3.4a: FDI and Real GDP per capita Growth in Mineral Rich countries (1970-2010)

Countries	FDI net inflows in % GDP	Real GDP growth
Botswana	6.5	7.0
Cameroon	4.4	3.1
Central African Republic	3.0	3.2
Lesotho	4.7	6.5
Mauritania	3.7	6.3
Namibia	2.2	4.8
Niger	4.3	1.1
Nigeria	4.2	7.1
Sierra-Leone	4.4	5.7
South Africa	2.1	2.4
Zambia	3.6	6.5
Average	3.9	4.9

SOURCE: UNCTAD, WDI, DATABASE 2011

Appendix: Figure 3.1 plots the real GDP growth among the 32 SSA countries. The picture looks a bit less gloomy when FDI performance is related to the size of the economy. Sub-Saharan African economies are generally much smaller than those of other developing countries and would quite naturally attract less FDI. The seven most dynamic countries identified as "frontrunners" in Africa by UNCTAD, 2011 are Botswana, Cote d'voire, Mauritius, Nigeria, South Africa, Seychelles, and Lesotho, have experienced the highest growth rates in the whole of Sub-Saharan African countries

Figure 3.1, shows that mineral-rich countries have higher levels of Real GDP per capita. The modest growth of these countries is buoyed by new mineral exports- Diamond in Botswana, oil in Nigeria, iron ore in Sierra-Leone and Uranium and oil in Niger and a return to peace in cote d'voire.

Table 3.4b: FDI and Real GDP per capita Growth in Mineral Poor countries (1970-2010)

Countries	FDI net inflows in % GDP	Real GDP growth
Benin	2.3	4.0
Burkina Faso	3.1	1.5
Burundi	3.3	0.3
Comoros	2.1	1.5
Cote d'voire	3.0	3.5
Ethiopia	4.8	3.4
Gambia	2.7	5.3
Ghana	3.4	3.3
Guinea Bissau	4.6	2.5
Kenya	2.7	1.8
Madagascar	3.1	2.5
Malawi	3.9	4.5
Mali	4.0	3.8
Mauritius	4.1	3.1
Mozambique	5.3	4.4
Rwanda	5.9	2.1
Senegal	2.8	3.2
Seychelles	5.7	6.5
Swaziland	3.7	2.5
Togo	4.2	4.0
Zimbabwe	4.9	2.2
Average	3.7	3.4

Source: UNCTAD, WDI, DATABASE 2011

Trends in services trade, particularly tourism (an important driver of growth in mineral poor countries such as Kenya, Mauritius and Seychelles, have mirrored developments in these economies. The real GDP growth of 6.5% of Seychelles is not surprising. The country is one of the most developed countries in Sub-Saharan Africa and it's known for its up market tourism and offshore financial centre. In recent years, to make the economy less dependent on tourism, Seychelles promoted the development of farming/fishing industries (UNCTAD, 2011). There have also been some policies actively designed to attract investment such as tax holidays, easing of import and customs controls, infrastructure investment and labour law reform.

3.4: Econometric Model and Estimation of Results.

This section, present results from estimating an unbalanced panel of 41 years for the period (1970-2010). Initially we pool observations across countries and years and then we control for country fixed effects. This is the appropriate technique to control for unobserved country heterogeneity. Similarly, we can use ordinary least squares (OLS) including country and year dummies, the so called least squared dummy variables (LSDV). The impact of FDI on growth can be estimated in a panel using the following equation:

$$g_{y,h} = \zeta g_{k,h} + \psi g_{f,h} + \gamma g_{w,h} + \varepsilon, \tag{3.10}$$

Where h identifies the countries in the panel, and the remaining variables are the ones in equation (3.9), and ε is a white-noise disturbance term. If unobservable country-specific growth determinants are to be taken into account, the equation (3.10) can be estimated as follows:

$$g_{y,h} = \xi_h + \zeta g_{k,h} + \psi g_{f,h} + \gamma g_{w,h} + \varepsilon, \tag{3.11}$$

where ξ_h is a time-invariant individual country-effect or country dummies (which avoid the requirement that countries in the panel should have a common concept).

The results obtained from the pooled OLS and fixed effects are presented in Table 3.5. The overall performance of the model is satisfactory with coefficients correctly signed and eight of the explanatory variables found to be statistically significant. We next include a dummy variable of mineral rich equal to 1 if a country is located in mineral-rich area and zero otherwise. This variable tests whether mineral-rich countries in SSA receive more FDI due to abundant in mineral resources.

Table 3.5: FDI and Growth: Baseline Specification

Variables	POLS	LSDV	FE
Capital (g_k)	0.05***	0.09***	0.04**
	(2.10)	(4.99)	(4.82)
FDI (g_{FK})	0.05**	0.02***	0.01*
	(2.00)	(2.00)	(2.10)
MVA	0.01***	0.1***	0.02***
	(3.65)	(4.89)	(2.00)
Human Capital	0.02***	0.03***	0.05***
	(24.12)	(31.25)	(8.98)
Inflation rate	-0.008***	-0.01***	- 0.02***
	-(6.10)	-(7.76)	-(4.03)
Infrastructure	0.09***	0.02***	0.08**
	(2.44)	(6.08)	(4.74)
Openness(T)	0.03*	0.10***	0.5*
	(2.23)	(2.57)	(2.10)
Government Size	0.01***	0.07***	0.04***
	(5.66)	(3.40)	(3.88)
Interaction terms			
FDI*Human cap			0.18*
			(2.79)
FDI*Infrastructure			-0.001***
			-(3.66)
FDI*Trade			0.005**
			(2.62)
FDI*Mineral-rich	0.23	0.12	0.34
	(1.86)	(1.76)	(1.66)
Year Dummies	NO	YES	NO
Country Dummies	NO	YES	NO
Diagnostic Test			
R-Square	0.56	0.41	0.57
F-statistic	7.39	2.45	4.38
No of Observations	1310	1280	1310

*Note: Robust t-statistics figure is shown in parenthesis, Significant at 1%*** ; 5%** and 10% * level of Significant*

The estimated coefficient of economic growth indicates that, other things remaining constant, a 1 percent increase in FDI would raise the GDP per capita growth of the SSA countries by 0.02%and 0.01% for the LSDV and fixed effect method respectively. The estimated coefficient of domestic capital is positive and statistically significant at the 5 percent level for LSDV and FE implying that the linkage between FDI and domestic investment is complementary. Therefore, FDI inflows augment and contribute to domestic capital formation to accelerate the development of the host countries.

Manufacturing value added has a positive relationship with growth as expected. This result suggests the contribution of the manufacturing sector to the overall economy. Our result is consistent with the findings in Romer (1986), Stokey (1991) and Grossman and Helpman (1990), who emphasized that learning by doing, can have a positive effect on economic growth.

Government size has a positive and significant relationship with growth, suggesting that government expenditure encourages economic growth via public investments; in other words, there is a "crowding in" effect of government expenditure. In essence, government expenditure initiatives are such that may lift long-run growth rates by increasing investment in physical capital, knowledge creation, human capital and research and development. This is in line with the findings of Adelegan (2000), Ayanwale (2007) but in contrary with the submission of Akinlo (2004).

Openness has a positive and significant relationship with economic growth. This is expected and is consistent with previous results such as those of Asiedu (2001). Li and Liu (2004) and Flexner (2000) also report a positive relationship between trade and economic growth in China and Bolivia, respectively. This result stresses the importance of static gains from economies of scale

due to market expansion. Countries with more open trade policy have less market distortions, high level of efficiency and competition, which enhance the spillover effects of FDI (Balasubramanyam et al., 1996).

Human capital variable had a positive and significant relationship with growth. The implication of this result is that the differences in technological absorptive ability may explain the variation in growth effects of FDI across countries. The level of human capital determines the ability to adopt foreign technology. Thus, large endowments of human capital in SSA are assumed to induce higher growth rates. Our result is consistent with the findings of (Christopoulos and McAdam, 2015) who argued that human capital may impact on growth through demonstration effects, complementarities and diffusion process induced by skills. Such effects can take place through openness and FDI, both of which affected human capital.

Inflation variable used as a proxy for macroeconomic instability has a negative relationship with growth as expected. This suggests that an unstable macroeconomic environment discourages the growth (Borensztein et al., (1998) and Li and Liu (2004)). Therefore, a lower inflation will pay off in terms of better long-run performance and higher per capita income.

Infrastructure; Infrastructure increases the productivity of investments and therefore, stimulates FDI flows. (Wheeler and Moody, 1992; Wang, 2002) documents the evidence that a good infrastructure facility reduces operating costs and thereby promotes FDI. The infrastructure variables do provide the expected positive sign in Table 3.5. The role of infrastructure in the economic growth of a country has been emphasized in both theoretical and empirical studies (Wang 2002, Ramiraz and Nazmi 2003, Rioja 2004) infrastructure facilities contribute to economic growth by improving amenities that enhance the living standards of the society.

Therefore, infrastructure is generally believed to be one of the essential factors for economic growth, especially roads, telecommunication services, electricity, water supply, etc.

According to Borensztein et al., (1998), foreign direct investment contributes to economic growth only when a sufficient absorptive capacity of the advanced technologies is available in the host economy. The level of domestic human capital and its interaction with FDI, therefore, play an important role in the growth-enhancing effect of the latter. The strong synergism between FDI and human capital as a factor affecting economic growth is consistent with the idea that the advanced technology embodied in FDI can increase the host's economic growth through its interaction with country's absorptive capacity.

To address the issue of absorptive capacity in the host country, in line with the second objective of this chapter, we include additional interaction terms to capture and separate out the synergistic effect between FDI and the level of human capital formation, the estimations presented in Table 5, control for among other factors, the level of human capital (represented by tertiary enrolment as a percentage of the GDP). The FDI-schooling (synergy) interaction variable is positive and statistically significant. The implication of this result is that the level of human capital and its interaction with FDI therefore play an important role in the growth-enhancing effect of the latter. The strong synergism between FDI and human capital as a factor affecting economic growth is consistent with the idea that the advanced technology embodied in FDI can increase the host's economic growth through its interaction with the country's absorptive capacity (see, Lucas, 1998; Borensztein et al., 1998).

Our results for interaction of FDI and Infrastructure confront prior evidence that good infrastructure facilities production reduces operating costs and their by promotes FDI. The

interaction term of FDI with infrastructure do not provide the expected positive sign. Our finding more likely suggests the poor state of infrastructural facilities in SSA. Infrastructure development, in particular, the availability of telephones, is not very reliable in most of the SSA countries. Indeed, foreign firms in the extractive industries often located in remote areas, which typically lack access to basic amenities such as electricity and water. According to Collier and Gunning (1999) about 78% of firms in Nigeria use private generators because electricity supply is unreliable. More recently, a number of studies have suggested a potential role of advanced infrastructure, in particular, in attracting FDI (Reynolds et. al., 2004; Yol and Teng 2009). A country's capacity for absorbing FDI depends highly on the infrastructure facilities in terms of a physical and regulatory framework available in the economy for foreign investments. Therefore, countries with advanced infrastructure absorb more FDIs than do countries with relatively low-level infrastructure facilities.

The interaction of FDI and trade openness bears a robust relationship with economic growth. This is in line with expectations more trade is expected to grow the economy, suggesting that FDI inflows are determined by the market and openness to trade of the host country. This is perfectly in line with the FDI theory.

Finally the positive, but not significant estimated coefficient of the FDI*mineral-rich interaction term implies that we cannot conclude that FDI has a different effect on mineral-rich countries than it does in mineral-poor countries. First, the continent is perceived as being inherently risky[16]. This perception of Africa is supported by the empirical evidence of Haque, Nelson and Matheson (1999), who find that commercial risk-rating agencies often rate African countries as riskier than

[16] FDI inflows to Africa still lag behind those of other regions of the world. The expected surge of FDI inflow into the continent has not occurred. The myriad of explanations varies from bias against Africa because of its risks, inappropriate environment, political instability, incessant coup d'état and absence of rule of law.

warranted by Fundamentals. Second, due to lack of knowledge about the countries in the continent, investment decisions are often not guided by country-specific conditions, but rather based on inferences from the environment of neighbouring countries. Thus, to some extent, foreign investors evaluate African countries as if the countries in the continent constitute "one big country"

Sensitivity Test of Endogeneity Problem

The basic motivation of the existing theoretical and empirical work is the potential effect of FDI and economic growth. It should be noted that the cross-country regressions presented here may be subject to endogeneity problem. The correlation between FDI and growth rate could arise from an endogenous determination of FDI that is FDI itself may be influenced by innovations in the stochastic process governing growth rates. For instance, any omitted factors that raise the rate of return on capital will also increase both the growth rate and the inflow of foreign direct investment simultaneously.[17] In these circumstances, there would exist a correlation between FDI and the country-specific error term, which would bias the estimated coefficients.

Although, in principle, the endogeneity problem can be avoided by applying instrumental variable techniques, the fundamental problem is that there are no ideal instruments available. A good instrument would be a variable which is highly correlated with FDI but not with the error term in the regressions. Nevertheless, we have tried to control for the endogeneity problem by using as instruments the lagged values of FDI and the other explanatory variables in the regressions.

[17] See Edwards (1990) for a discussion on determination of foreign direct investment in LDC.

Table 3.6: FDI and Growth: Instrumental variables estimation

Variables	(1)	(2)	(3)
Capital	0.01***	0.02***	0.03**
	(6.48)	(4.20)	(4.41)
FDI	0.04**	0.01***	0.03*
	(2.00)	(4.84)	(2.37)
MVA	0.01***	0.1***	0.02***
	(3.81)	(5.09)	(2.00)
Human Capital	0.02***	0.03***	0.05***
	(24.20)	(30.51)	(8.91)
Inflation rate	-0.008***	-0.09***	- 0.02***
	-(6.02)	-(7.42)	-(3.93)
Infrastructure	0.09***	0.02***	0.08**
	(2.40)	(5.78)	(4.82)
Openness(T)	0.00*	0.09***	0.04*
	(1.59)	(2.39)	(2.10)
Government Size	0.01***	0.07***	0.04***
	(5.58)	(3.30)	(3.73)
Interaction terms			
FDI*Human cap			0.20*
			(3.58)
FDI*Infrastructure			-0.003***
			-(2.66)
FDI*Trade			0.03**
			(3.62)
FDI*Mineral-rich			0.18
			(1.45)
Year Dummies	NO	YES	NO
Country Dummies	NO	YES	NO
Diagnostic Test			
R-Square	0.59	0.68	0.56

F-statistic	7.39	2.45	4.38
No of Observations	1309	1310	1281

*Note: Robust t-statistics figure is shown in parenthesis, Significant at 1%*** ; 5%** and 10% * level of Significant. Using as instruments, the lagged value of FDI, the two-stage least squares (2SLS) estimation was done the cross-section of countries for the period 1970-2010 using the same instruments.*

The results of this instrumental variable estimation are reported in Table 3.6. The regression results reported in the three specifications show that the instrumental variable estimations yield qualitatively similar results to those obtained by baseline specification. The estimated coefficients on FDI and Economic growth are still significantly positive. The interaction terms with human capital and FDI are still significantly positive, but the same cannot be reported for interaction of FDI and infrastructure. The interaction term between FDI and the trade openness indicator is positive and significant as reported in Table 3.6. This finding indicates the importance of trade liberalisation for productivity gains to realize from FDI.

3.5: Conclusions

This study investigates the impact of FDI on economic growth in SSA countries. Our results indicate that the effect of FDI on economic growth is positive and statistically significant on the key growth determinant variables (Domestic capital and Trade openness). We can argue that SSA countries should orient their economic policies to changes and improve the government consumption and more investment in human capital to support a sustainable economic growth because increased spending on advanced education and training contributes to economic growth by easing the adoption of foreign technologies.

Our results, however, do support some previous findings that there is a level of human capital below which FDI impedes or contributes little to economic growth. For FDI to serve as an engine of growth and integrated into the mainstream of the economy, the absorptive capacity of its

citizens which is related to the ability of a firm to recognize the value of new information, assimilate and apply it to commercial use must be the objective of the host economy.

The interaction of FDI and mineral rich dummy implies that we cannot conclude that FDI has a different effect on mineral-rich countries than it does in mineral-poor countries. Although Sub-Saharan African countries are differently endowed with natural resources (crude oil, minerals, gold, iron ore, etc.) which in effect should contribute to their attracting FDI and improving the economic development of the region. Therefore, governments must improve political stability, law and order, socioeconomic conditions and the investment profile and must reduce the level of corruption to attract more FDI and domestic investment because of the value added in many sectors which reduces unemployment rate.

The results have three policy implications. First, to enhance FDI flows, Sub-Saharan African countries need guided training of the human resources of their country to enable them to contribute positively to economic growth wherever they find themselves employed either with foreign or indigenous firms. Second, policies that have been successful in other regions should not be blindly replicated in SSA since these policies may have a differential impact on Africa. Finally, for sustainable economic development in SSA, development strategies in the region should focus on ways to attract both domestic and foreign investment. The political system should also be stable minimising the sources wasted due to corruption.

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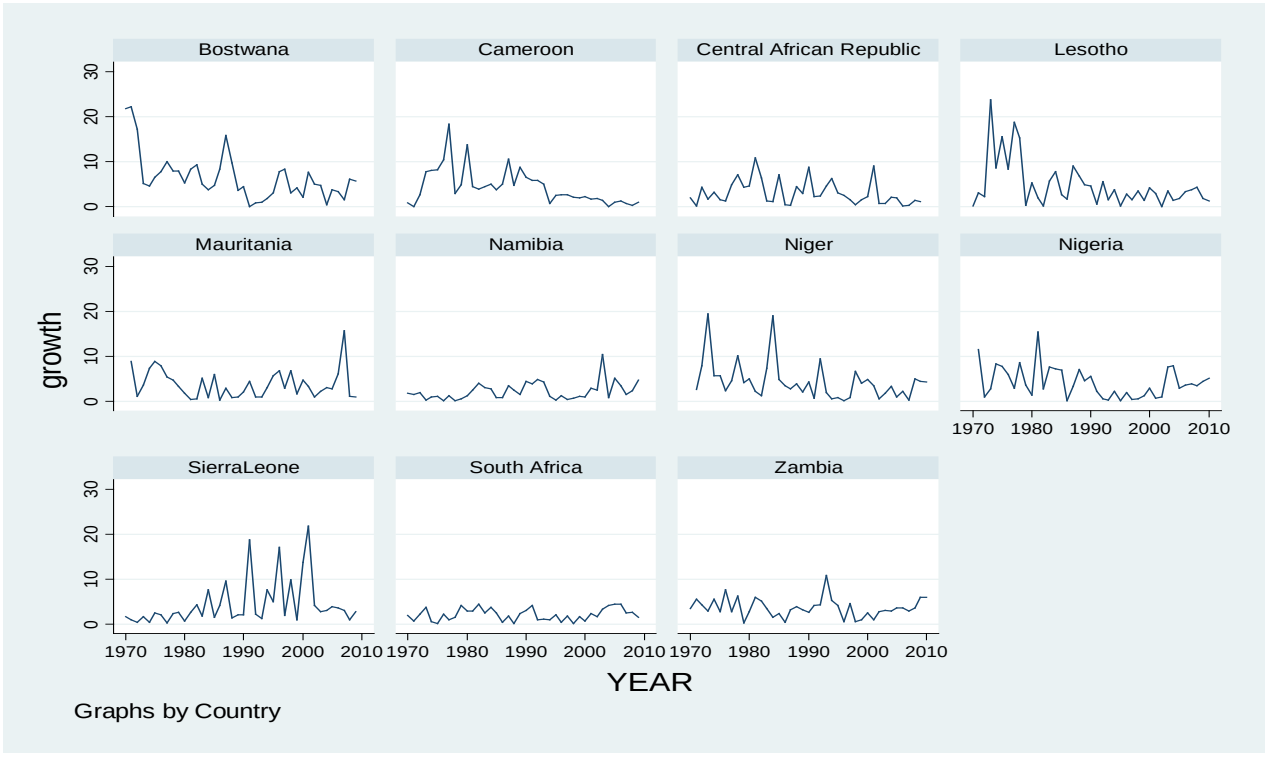
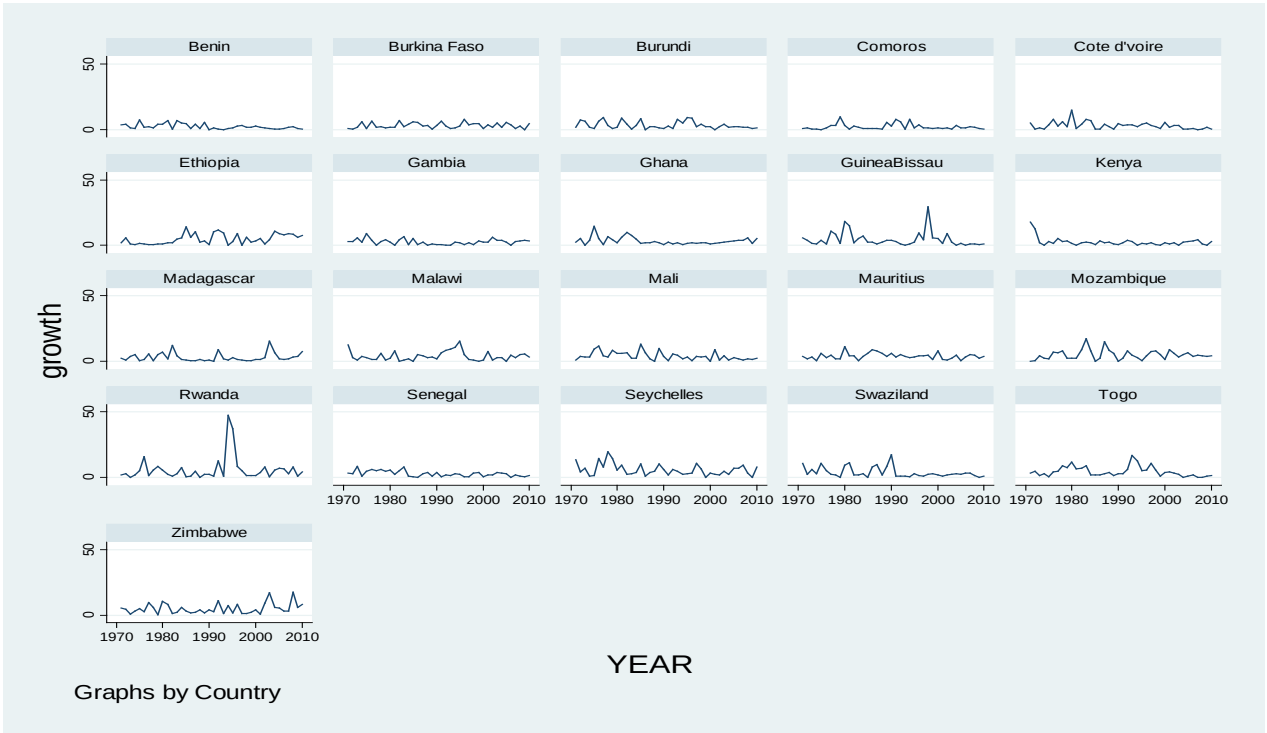
Appendix:

Table 3.1: List of Variables, Description and Data Source

Variable	Description	Source
GDP per capita	Real Gross Domestic product per Capita in 2000US$ constant prices	World Development indicators (WDI)
Exports as % of GDP (X)	Exports of goods and services as a % of GDP	WDI
Imports as % of GDP (M)	Imports of goods and services as a % of GDP	WDI
FDI net inflows as % of GDP (FDI)	Weighted Average Net inflows (new investment inflows less disinvestment) as a % GDP	WDI &IMF
% Population with Secondary Education (HC)	% of population with Secondary Education as the highest level attained	Barro& Lee (2010), WDI, IMF
Government size (GOVCON)	Government consumption as a ratio of GDP	IMF, World Economic Outlook (WEO)
Infrastructure	Number of telephone mainlines per 1000 population.	WDI & IMF(WEO).
Capital stock	Gross capital formation (GFCF) as percentage of GDP	IMF& WDI.
Inflation	Rate of Inflation in percent	IMF& WDI
Manufacturing Value Added(MVA)	Manufacturing value added as percentage of GDP	IMF, WDI, UNCTAD
Openness to trade (T)	This is calculated as the ratio of exports plus imports over Real GDP.	WDI
Per capita growth(g)	This is measured as the growth of real per capita GDP in constant dollars.	WDI

Figure 3.1: The plots of real GDP growth





CHAPTER 04

OUTPUT AND INSTITUTIONS IN SUB-SAHARAN AFRICA (SSA) COUNTRIES

4.1: Introduction

The long tradition of the growth literature in explaining cross-country differences in income per capita has focused on factors of physical and human capital (Barro, 1990; Mankiw et al., 1992; Lucas, 1998; Temple, 1999), innovation (Romer, 1990; Rebelo, 1991) and technological diffusion (Grossman and Helpman, 1991; Aghion and Howit, 1992; Barro and Sala-i- Martin, 1997). The quality of the institutional framework is a relatively new aspect in the ongoing puzzle of growth determinants (Oslon, 1996; Landes, 1998; Easterly, 2001; Easterly and Levine, 2002; Alcala and Ciccone, 2002; Dollar and Kraay, 2002; Asiedu, 2006; Ndulu et al., 2008; Booth, 2011 and Acemoglu, Naidu, Restrepo and Robinson (2014)). The widespread view among researchers and policy makers is that low economic performance in developing countries is the causal effect of poor-quality institutions, weak rule of law, absence of accountability, tight control over information, and high levels of corruption (Brautigam and Knack, 2004; Ndulu, 2006; Johnson, Ostry and Subramanian,2007; and Acemoglu, Gallego and Robinson, 2014). In a neoclassical growth setting, the link between growth and institutions is described as follows: poor institutional quality is a serious impediment for both domestic and foreign investment; this decreases the level of capital deepening in the economy, which, in turn, lowers productivity growth and per capita income. This consideration has made institutions a key component in explaining income differentials across countries and the recent literature has included institutions as a source of economic growth.

Convergence of output per worker to the long-run steady state is conditional to factors related to institutions[18] (see, for example, Hall and Jones, 1999; Kaufmann, Kraay and Zoido-Lobaton, 1999; Acemoglu, Johnson and Robinson, 2001; Easterly and Levine, 1997).The institutional framework in a country affects economic performance through various channels. From a developing country's perspective, a vital issue is the existence of broad related institutions to ensure that citizens are well-behaved within some standard social norms allowing mainly for economic activity to take place in an environment that fully respects property rights. Fundamental institutions such as the rule of law and the protection of property rights are still rudimentary in many African countries, where politicians and bureaucrats often abuse their power.[19]In the past few years, almost a quarter of Sub-Sahara African (SSA hereafter) countries have been involved in a regional (or civil) war or similar substantial internal strife (Gray and McPherson, 2001).The consequences of political instability are the disruption of domestic revenue, investment, production and trade. The economic activity is paralysed and there is a massive deterioration of productive capacity in the country (Wei, 2000a, 2000b; Haggard, 2004; Rodrik Subramanian and Trebbi, 2002; Daniele and Marani, 2006 and Johnson et al., 2007). In cases where SSA countries manage to improve governance as a result of institutional reforms, economic performance is much better even if countries are poor in oil and gas resources.[20]

[18]See for example, Easterly and Levine, 1997; Hall and Jones, 1999; Kaufmann, Kraay and Zoido-Lobaton, 1999; Acemoglu, Johnson and Robinson, 2001.

[19] For example, phenomena in which political officers deliberately disobey court orders have been very common in Nigeria and Ghana, (Collier and Gunning, 1995).

[20] This is the case for Botswana, Tanzania, Rwanda and Ethiopia which have become the fastest growing economies in the region. Their superior economic performance was mainly attributed to their sound institutional environment (Collier, 2007a; Acemoglu, Johnson and Robinson, 2001). On the contrary, countries abundant in natural resources such as Nigeria, Niger, Zambia, Coted'voire and Mozambique have performed poorly because they fail to make improvements in crucial institutional aspects such as property rights, rule of law and sound monetary and fiscal policy.

SSA has experienced the slowest economic growth of any region in the world, with severe poverty to become continuously worse. Conventional factors of growth (physical and human capital accumulation) have weak explanatory power for Africa's growth experience and the attention has more systematically turned into the institutional aspect (Aron, 1996, Djankov et al., 2002, Naude, 2004, and Robinson, 2010).Emphasis is given to the institutional environment among some other factors very crucial for this geographical region, such as tropical location (Sachs and Warner, 1997), cultural endowment and ethnic fractionalization (Easterly and Levine, 1997).

The quality of institutions refers-among other factors-to property rights, rule of law and political stability that are viewed as the most fundamental determinants for protecting private investment. A well-functioning democratic regime is a key prerequisite for attracting domestic and foreign investment preventing the abuse of power from political and business elites. These considerations have also placed in the centre of attention another metrics of institutional quality such as government effectiveness, bureaucratic honesty, contract enforcement, and the rule of law.

Following the previous discussion, one can identify a twofold role for institutions. First, well-established institutions ensure that national resources are used optimally, hence minimising slack and loss of productive capacity and second the existence of an appropriate institutional environment is a catalyst for improving effectiveness of other crucial growth determinants such as FDI. The main goal of this chapter is to investigate how different institutional measures (i.e. Property rights index, rule of law, corruption, political stability, bureaucratic delays, business regulation index, government effectiveness, regulatory quality) impact on GDP per capita in SSA, whereas we also consider the interaction of various institutions with other economic features that are expected to drive output per worker.

The present study contributes to the empirical growth literature for the African region in numerous ways. First, the evidence of this study covers the entire spectrum of the SSA countries (32) over a much longer time span 1970-2010 compared to previous studies.[21] Institutional changes take place at a slow pace and for that reason one needs to consider a relatively long time series in order to capture these changes. Studies with short time spans might mistakenly attribute short-run business cycle fluctuations to institutional changes, for instance, Zidi and Dhifallah (2013), includes 30 African countries, but for a shorter period, 1998-2011 and Jude and Levieuge (2013), using few African countries for the period, 1984-2009. Second, we analyse the dual character of institutions within a growth model framework, which has been previously neglected. On one hand, institutional quality is a necessary condition for a better use of the existing national resources, while on the other hand it creates the appropriate market augmenting framework for attracting FDI. The latter is of particular importance for capital scarce countries such as SSA. Third, the majority of previous studies on the role of institutions on economic development in SSA rely on qualitative analysis (North, 1990; Oslon, 1993), instead we analyse institutions within a rigorous growth set-up, which incorporates all the standard growth determinants found in the empirical literature (Dollar and Kraay, 2002;Ndulu, 2006 and Booth, 2011).

The rest of the chapter is organised as follows: Section 2 survey the key studies on the empirics of Growth and Institutions. Section 3 presents the structural model of output per worker with Human capital and Institutions. Section 4 discusses the data set used in the empirical analysis. Section 5 outlines the methodology and the empirical results. The last section concludes the result.

[21] For example, Gyimah-Brempong, (2001) includes 21 African countries in total for a very short period, 1993-1999. Brautigam and Knack, (2004), refers to 1982-1997 and only for 24 SSA countries while Asiedu, (2006) uses 22 countries for 1984-2000.

4.2: Survey of Key studies on the Empirics of Growth and Institutions.

This section discusses some of the most recent studies in the area of institutions and growth highlighting their key findings. Acemoglu et al. (2001) (AJR hereafter) use mortality rates of colonial settlers as an instrument for the institutional quality, they argue that the settler mortality rate is a key aspect to understand the types of institutions that European colonisers established in areas such as Africa. AJR documents the evidence that, there is an almost linear relationship between log settler mortality and measure of institutions. This relationship shows that ex-colonies where Europeans faced higher mortality rates have substantially worse institutions. For instance, in the United States, Australia, and New Zealand, where they settled, good institutions that enforced rule of law were established, and these encouraged investment in these colonies. In the other extremes, as in the Congo or the Gold Coast, they set up extractive states with sole intention of transfer of resources back to their home country. These institutions were detrimental to investment and economic progress. The colonization strategy was in part determined by the feasibility of European settlement. In places where European faces very high mortality rates, they were more likely to set up extractive states.

The key element of Alcala and Ciccone (2004) (AC hereafter), is to investigate the impact of trade openness on income per capita, including factors of institutional quality. The main finding is that trade openness remains the most crucial growth determinant while the institutional effect exists only as far as capital-output ratio and human capital are concerned. This can be viewed as the indirect effect of institutions in the sense that better institutions stimulate capital deepening (as already mentioned), which in turn can boost productivity and growth. Easterly and Levine (2003) (EL hereafter), run regressions of the levels of income on various measures of endowments, institutions and policies. The main results are that institutions exert an important

effect on development, while endowments do not, other than through their effect on institutions. Policies also do not exert any independent development. Rodrik et al. (2004) (RST hereafter) emphasise the superiority of institutions over geography and integration in economic development, using recently developed instruments for institutions and trade to control for endogeneity bias in the econometric estimation. They argued that quality of institutions is most fundamental, determinant of huge cross-country differences in income per capita than geography, integration, landlocked and culture.

Another large body of literature focuses on the role of institutions in affecting the incentives for investment in physical capital, human capital and innovation, (Hall and Jones, 1999; Acemoglu et al., 2004; Eicher and Leukert, 2006). These studies show that good institutions encourage private investment, improve the overall efficiency of the economy and thus significantly contribute to growth. In the light of these arguments, we expect sound institutional quality to favour technology transfer and productivity spillovers to domestic firms, while promoting crowding-in effects on domestic investment. The existing evidence on this particular nexus is still very limited. Some exceptions are the study of Busse and Groizard (2008) that investigate the role of business regulations in both developed and developing countries. Their main argument is that countries with restrictive regulations cannot exploit FDI inflows efficiently due to constraints in factor reallocation. On the contrary, Farole and Winkler (2012), show that business freedom has no significant effect on intra-productivity spillovers and institutions. Both of these studies use cross-sectional analysis, capturing only individual heterogeneity at a specific period without controlling for time heterogeneity. Jude and Levieuge (2013), explore the role of the institutional environment on growth with various alternative econometric techniques. The

critical element of this study is that institutions matter for growth regardless the country's level of development.

Kaufman et al. (2009) find significant evidence for the impact of institutions and related economic policies on medium and long-term growth. Additionally, Cavalcanti and Novo (2005) show that: (i) the marginal contributions of institutions are larger at the bottom quartiles of the (conditional) distribution of output per worker, which implies that, poor countries are likely to benefit more from better institutions, and (ii) the conditional distribution of output per worker tends to become less disperse as countries reach higher levels of institutional development. Therefore, institutions are fundamental not only in promoting growth (output per worker) but also in promoting the convergence in output per worker across nations. Other recent studies in the growth-governance (institutions) nexus can be found in Chong and Calderson, (2000), Ahrens and Meurers, (2002), Dollar and Kraay, (2002), Isksson, (2007), Zhauang, (2010) and Akinlo (2011). These studies highlight the existence of several channels through which improvement in the protection of property rights can affect physical investment and also investment in financial assets. First, investors will be more willing to invest their capital when property rights are more protected, and as result, they have confidence that their returns may not be appropriated. Second, institutions also lay the foundation for the operation of the capital market and lastly, these studies have emphasised the importance of financial institutions to investment.

The cross-country growth analysis encounters some standard data challenges. The existing studies-in their attempt- to control for the impact of institutions on growth use some controversial factors. More precisely, Easterly and Levine (1997) use the number of assassinations to proxy for social disturbance while Alesina and Perotti (1996) use the number of assassinations, deaths, coups and demonstrations to compute an index of political instability.

Alesina et al., (1996b) approximate political instability using dummy variables that indicate regime change, regular and irregular transfer of executive power. Fosu (2001) measures political instability using three variants of 'coup plots', namely successful, abortive, and officially reported coups. Collier and Gunning (1999) use the number of months of war in a country to proxy for social disturbance. These measures are only proxies and thus can be subject to alternative interpretations. The present study [22] applies a set of variables that capture the institutional environment and its various aspects more appropriately. This novelty is another crucial contribution of the present study to the current literature.

[22] An important strength of our study is the use of newly assemble series from variety of sources, details of which are contained in the Appendix. It is important to stress that these data enable us not only to estimate diverse specification, but also to construct measures of key variables that often closer to theoretical ideas than those used in the previous studies.

4.3: A structural Model of Output per Worker with Human Capital and Institutions

The theoretical approach adopted in this study draws upon Solow (1956) growth model and the subsequent empirical modifications of Mankiw et al. (1992) and Barro and Sala-i-Martin (1995). The departure point is a standard production function with three inputs, physical capital, human capital and labour. The model also includes an exogenous efficiency parameter. Output in country in country *c* is determined from the following production function:

$$Y_c = A_c f(K_c, L_c, H_c) \tag{4.1}$$

Y is the quantity of output, K is physical capital, H is human capital and L is labour. Parameter A indicates technology in country c. The Cobb-Douglas approximation of this production function is written as:

$$Y_c(t) = K_c(t)^{\alpha} H_c(t)^{\beta} (A_c(t) L_c(t))^{1-\alpha-\beta} \tag{4.2}$$

The model assumes decreasing returns to scale (DRS) for the capital inputs (i.e. $\alpha + \beta < 1$) while overall the production function is subject to constant returns to scale (CRS). Parameter α is the partial elasticity of output with respect to physical capital and β is the partial elasticity of output with respect to human capital. It is assumed that the technology parameter A has two components: economic efficiency $I(t)$ that depends on institutions as well as other economic policy variables and the level of exogenous technical progress $\Omega(t)$. This assumption implies that the rate of change in parameter A is not common across countries as assumed in the original model. The rate of exogenous technical change can be common across countries, while the factors (i.e. Institutions) affecting the efficiency component of A are country variant. The efficiency component $I(t)$ can be written as log-linear function of institutional variables V of type

j, while the latter $\Omega(t)$ is assumed to grow at rate $g(t)$ common for all countries. Labour input $L(t)$ grows at a rate of $n(t)$. These can describe the model as follows:

$$A_c(t) = I_c(t)\Omega(t) \tag{4.3}$$

$$\ln I_c(t) = \theta_o + \sum_j \theta_j V_c^j \tag{4.4}$$

$$\Omega(t) = g(t)\Omega(t) \tag{4.5}$$

$$L_c(t) = n_c(t)L_c(t) \tag{4.6}$$

Let assume that the share of investment in physical and human capital is constant at s_k and s_h respectively, and that both types of capital depreciate at a common rate δ. We express (4.1) in per labour effective units as follows:

$$y_c(t) = k_c(t)^{\alpha} h_c(t)^{\beta} \tag{4.7}$$

Lower case letters define variables per units of effective labour as:

$$y = Y / AL \ , \ k = K / AL \ , \ h = H / AL$$

The evolution of the economy with respect to physical and human capital is determined by the following conditions:

$$\Delta k_c(t) = s_{k,c} y_c(t) - (n_c + g + \delta)k_c(t) \tag{4.8}$$

$$\Delta h_c(t) = s_{h,c} y_c(t) - (n_c + g + \delta)h_c(t) \tag{4.9}$$

The above equations imply that the steady state values of physical and human capital are given by the following expressions:

$$k^{*} = \left(\frac{s_k^{1-\beta} s_h^{\beta}}{n + g + \delta} \right)^{1/1-\alpha-\beta} \tag{4.10}$$

$$h^{*} = \left(\frac{s_k^{\alpha} s_h^{1-\alpha}}{n + g + \delta} \right)^{1/1-\alpha-\beta} \tag{4.11}$$

Substituting the steady state values (4.10) and (4.11) into the production function (4.7), taking logs and re-arranging we obtain:

$$\begin{aligned} \ln\left(\frac{Y}{L}\right)_c (t) = \ln A_c(t) - \frac{\alpha+\beta}{1-\alpha-\beta}\ln(n_c + g + \delta) \\ + \frac{\alpha}{1-\alpha-\beta}\ln s_{k,c} + \frac{\beta}{1-\alpha-\beta}\ln s_{h,c} \end{aligned} \tag{4.12}$$

Equation (4.12) states that income per capita in the long run is a function of physical investment share and human capital share. Further, we decompose parameter *A* allowing for the institutional effect on output per capita. Equation (4.12) is now written as:

$$\begin{aligned} \ln\left(\frac{Y}{L}\right)_c (t) = \theta_o + \sum_j \theta_j V_c^j - \frac{\alpha+\beta}{1-\alpha-\beta}\ln(g + n + \delta) \\ + \frac{\alpha}{1-\alpha-\beta}\ln s_{k,c} + \frac{\beta}{1-\alpha-\beta}\ln s_{h,c} \end{aligned} \tag{4.13}$$

The functional form of equation (4.13) is a modification of the Solow model augmented for institutions and human capital and it will be used as a benchmark specification to investigate the determinants of income per capita in SSA countries for the period 1970-2010.

4.4: Dataset

4.4.1 General Description

An important strength of the study is the use of rich new panel data set from a variety of sources. The data is annual, for 32 Sub-Saharan African countries. The study briefly outline the content of each variable here, a more detailed description can be found in Appendix Table 4.1. Another important strength of our data is the four-decade time period utilised here. To implement this model our focus will be on measurement of human capital and institutional variables, more importantly, our data will explore the effect of adding human-capital accumulation and good institutions to the Solow growth model.

Data on GDP per capita were taken from World Bank's Development Indicators (WBDI). Data are expressed in constant 2000 USD. Human capital is measured by years of schooling in the population aged 15 and over which is taken from Barro and Lee (2000). Investment in physical capital is proxied by Gross Fixed Capita Formation as a share of GDP which is taken from World Bank's Development Indicators. Population which is the annual growth rate of the working age population were taken from World Bank's Development Indicators (WDI) and FDI data are taken from various issues of the International Monetary Fund and International Financial Statistics and World Bank's Development Indicators (WBDI).To capture institutional quality, we use several indicators from Kaufmann et al. (2003) and La Porta et al., (1999); this includes corruption, government effectiveness, political stability, government effectiveness, rule of law and regulatory quality. For the period 1970-1979, all series have missing values for most SSA countries. Our complementary sources for gathering information for missing values during this period include Corruption Index from International Country Risk Guide (ICRG), UNECA

database and African Development Bank (ADB *database*) and Statistical Bulletin of Central Bank of SSA countries.

4.4.2; Definition of Variables

This study uses an unbalanced panel of 32 African countries for the period 1970-2010[23].For the purpose of our research, we considered first, the measure of investment in physical capital which we proxy by s_k which is the fraction of income invested in physical capital (typically proxied by the share of investment in GDP) is one of the main factors determining the level of real output per capita. For the human-capital accumulation (s_h) measures approximately the percentage of the working-age population that is in secondary school. Again, we assume that g and δ are constant across countries. g reflects primarily the advancement of knowledge, which is not country-specific. And there is neither any strong reason to expect depreciation rates to vary greatly across countries, nor are there any data that would allow us to estimate country-specific depreciation rates, as such $n+g+d$ will be measure as n which is the average rate of growth of the working-age population, where working age is defined as 15 to 64[24]. For the institutional variables we considered 5 socio-political indicators related to political risk, namely: corruption, government effectiveness, rule of law, regulatory quality, and political stability. Institutional variables are hard to measure and quantify. For instance corruption often involves illegal activities, most corrupt practices are hidden, and such acts are not easily quantifiable. For most indicators data on African countries were not covered until 1997. Prior to 1997, I have relied on

[23] Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Comoros, Cote d'voire, Ethiopia, Gambia, Ghana, Guinea-Bissau, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Nambia, Niger, Nigeria, Rwanda, Senegal, Seychelles, Sierra-Leone, South Africa, Swaziland, Togo, Zambia and Zimbabwe.

[24] Data on the fraction of the population of working age are from the World Bank's Development Indicators (WBDI).

historical data from the National accounts and Central Bank of the countries covered. Corruption data from International Country Risk Guide range from 0-6; low scores indicate high corruption while high scores indicate less corruption. For the rule of law index measurement, we follow Rodrik, Subramanian, and Trebbi (2004) and Kaufmann, Kraay, &Mastruzzi (2010)[25]. This index measures the quality of contract enforcement, the quality of police and courts of law and the likelihood of crime and violence. The rule of law index ranges from 0 to 6 with 0 reflecting the lowest incidence of the rule of law and 6 reflecting the highest. The index of political stability measures the likelihood that the government in power will be destabilised by unconstitutional means, including domestic violence and terrorism. This index captures the idea that the likelihood of frequent changes in government can affect the quality of governance by affecting the continuity of policies (Kaufmann, Kraay and Mastruzzi, 2004). Thus the index ranges from a scale of 0 (less democratic) to 6 (strongly democratic). The government effectiveness index made available by the World Bank Development Indicators, indicate the ability of the government to formulate policies. Like the political stability index, it is scaled from 0-6. Low scores indicate less government effectiveness and high scores indicate better quality of governance. Finally the regulatory quality index measures policies and regulations that permit and promote private sector development. The index ranks economies from 0-6; low scores indicate weak enforceability. In general, these indicators are widely recognised and used as high-quality measures of political risk and institutions[26]. Table 4.4 (Appendix) reports the correlation matrix for the quality of institutional indices. Table 4.5 presents the summary of descriptive statistics using data averaged

[25]See http://info.worldbank.org/governance/wgi/pdf/rl.pdf. Rule of law as our institutions measure also fits well with North's (1990) view that the 'inability of societies to develop effective, low-cost enforcement of contracts is the most important source of both historical stagnation and contemporary underdevelopment in the Third World'

[26]In recent years, they have been used, for instance, by Bassanini, A., Scarpetta, S and Hemmings (2001), Rodrick et al., (2004), Busse&Hefeker (2005) and Cristina J. & Gregory L. (2013).

over 1970-2010. There are considerable cross-country variations in the data. The variables vary greatly across countries. For instance, the corruption index from our summary statistic ranges from 0.01 to 5.87 with 0.01 reflecting the incidence of high corruption in some of the countries in SSA. Again the rule of law index ranges from 0.03 to 5.72 with0.03 reflecting the lowest incidence of the rule of law and 5.72 reflecting the highest.

Table 4.5: Summary statistics of included variables: Sample 32 Countries (1970-2010)

Variable	Observations	Mean	Std. Deviation	Minimum	Maximum
GDP per capita	1312	6.32	1.54	4.63	13.51
Physical cap	1312	18.69	8.81	2.00	76.69
Human Capital	1311	26.34	22.02	1.01	124.74
Population growth	1312	53.16	3.70	47.00	71.21
FDI	1312	5.43	8.28	$6.90^{-0.07}$	111
Corruption	1312	1.98	1.27	0.01	5.87
Gov effectiveness	1312	1.99	1.27	0.01	5.87
Political Stability	1312	1.80	1.16	0.01	5.94
Rule of Law	1312	1.79	1.10	0.03	5.72
Regulatory quality	1312	1.99	1.27	0.01	5.88

Source: World Bank's Development Indicators (WDI), International Country Risk Guide

4.4.3 Econometric Model

This section, presents the econometric model used to estimate an unbalanced panel of for 32 countries over the period (1970-2010). We control for unobserved country heterogeneity by using country fixed effects, similarly we use year dummies to capture common macroeconomic effects across countries. To assess the roles which institutional quality exert on output, we use a standard growth, regression framework which mostly follows others' work (Barro 1991; Mankiw et al., 1992; and Levine and Renelt, 1991) in the literature.

$$\Delta Iny_{it} = \alpha_1 + \beta_1 \mathbf{I}_{it} + \beta_2 \mathbf{X}_{it} + \varepsilon_{it} \tag{4.14}$$

Where y measured GDP per capita in country i at year t ,$\mathbf{I}$ stand for institutional variables, whereas $\mathbf{X}$ is the vector of other control variables that determine growth such as domestic investment, population growth and human capital, finally equation (4.14) is augmented with a well behaved error, ε_i with zero mean and constant variance.

The traditional growth regressions generally carry the problems like endogenous regressors, measurement errors and omitted variables (see Acemoglu (2009)). Given these problems, least square estimations are biased since unobserved omitted variables may potentially correlate with one of the regressors. The use of panel data helps alleviate the problem of omitted variables by taking into account of country and time specific effects (Islam, 1995), thus allowing the unobserved time-in-variant country specific effect to be controlled for. Our growth models are therefore estimated using pooled ordinary least squares (OLS), least squared dummy variables (LSDV) and fixed effect methods.

Table4.6: Output and Institutions: Baseline Specification, Dep. Variable: GDP per capita

Variables	POLS	LSDV	FE
$\ln(S_k)$	0.31***	0.12***	0.12***
	(7.81)	(8.29)	(8.73)
$\ln(hum)$	0.56***	0.15***	0.07***
	(23.50)	(8.21)	(5.93)
$\ln\ (n+g+d)$	3.02***	2.41***	1.99***
	(9.89)	(14.68)	14.45)
Institutional Variables			
Corruption	0.05***	-0.02***	-0.009***
	(2.84)	(-2.90)	- (1.76)
Gov. Effectiveness	0.11***	-0.008	0.006
	(1.97)	(-0.01)	(1.03)
Political stability	0.11***	0.06***	0.02***
	(6.94)	(9.76)	(9.84)
Rule of Law	0.05***	0.008	0.006
	(2.90)	(1.25)	(1.03)
Regulatory quality	0.031	-0.008	-0.003
	(1.46)	(-0.12)	(-0.48)
Year Dummies	No	Yes	No
Country Dummies	No	Yes	No
Diagnostic Test			
R-Square	0.56	0.97	0.17
No of Observations	1311	1311	1312

*Notes: GDP per capita is the output over four decades. Numbers in brackets below coefficient refer to t-statistics. Asterisks denote significance as follows, *** at 1%, ** at 5% and * at 10%. Robust standard errors were used in obtaining these t-statistics. The estimator used in all specifications is OLS, LSDV and FE with country and year dummies where specified.*

4.5 Empirical findings

Table 4.6, presents regressions of the log of GDP per capita on the log of investment in physical capital accumulation ($\log S_k$) the log of $n + g + \delta$, log of the percentage of labour force in secondary school ($\log H$) and measures of corruption, government effectiveness, political stability, rule of law and regulatory quality. The estimated coefficients and implied parameters for the basic factors driving the growth, physical capital accumulation, human capital and population growth appear with the expected signs and are highly significant. The coefficients for physical capital accumulation and human capital are broadly consistent with the empirical literature. However, our result on population growth is in contrast with some other studies on growth (see, for example, Mankiw et al.,1992; Bassanini et al.,2001) that have found no or very limited effects of this variable on growth, our result attributed to the labour intensive nature of the economy in SSA countries.

The Physical Capital variable coefficient is significant and positive, showing that the rate of physical capital (typically proxied by the share of investment in GDP) is one of the main factors determining the level of output per worker. Endogenous growth models (Barro, 1990; Romer, 1990; Mankiw et al., 1992; Lucas, 1998; Temple, 199) allow for more permanent effects of increases in investment on the steady state growth rate of output per capita. First, the technological progress could, to some extent, be embodied in the process of investment. Second, the introduction of new capital may lead to better organisation and efficiency even if no new technology is incorporated in the capital equipment. It could also be assumed that the growth rate of labour productivity of workers operating on new machines could be related to investment in new technology.

Human Capital variable in these augmented models compared the role of human capital to that of physical capital, in so far as its accumulation implies capital deepening with an associated period of accelerated growth towards a new steady state. This variable has a positive and significant relationship with GDP per capita in those countries, indicating that investment in human capital (e.g. higher expenditures on education and training) might play a more persistent role in the growth process. Lucas (1998), Grossman and Helpman (1991) and Aghion and Howitt (1998) argued that advances in technological progress often have strong links with education, especially at the higher level.

Population growth has a larger impact on output per capital than the textbook model indicates. In the textbook model higher population growth lowers income because the available capital must be spread more thinly over the population of workers. In the augmented model a well-educated workforce would increase the output per worker because of new innovations.

Corruption variable has negative and significant relationship with output in LSDV and FE. The implications of this result suggested that corruption do not provide any evidence or support for output worker. Previous studies (Barro 1991 and Mauro 1993) have shown that corrupt, unstable governments spend less on education because corruption opportunities may be less abundant on education than on other components of government expenditure. Corrupt practices has affected the economy of SSA countries, when the economy it's below its steady-state income level, higher corruption could lead to lower growth, for a given level of income. Mauro (1995) argues that corruption may lead to more bureaucratic delay. For instance, when individuals offer speed money to officials, they contribute to establishing a custom, so that the granting of, say, a work permit will be artificially delay until a bribe is received.

Government effectiveness has a positive sign for POLS, but negative for the other two specifications which are not statistically significant and cannot be relied on. Thus, the government effectiveness indicator denotes the quality of public service provision, the competence of civil servants, the independence of the civil from political pressures, and the credibility of the government's commitment to policies. Thus, theoretically, if government institutions were functioning efficiently by reducing costs of transactions, there would be an increase in the productivity and in turn would stimulate and improve output per worker, thus economic growth. Some countries in Sub-Saharan African countries (Botswana, Mauritius, South-Africa, Seychelles, and Ethiopia) that have succeeded in ensuring what is generally now described as "good governance" as a result of good institutions tends to be faring well and has become the fastest growing economies in Africa (Collier, 2007).

Political stability has a positive and significant relation with output as expected. First, it can be argued that political stability has a significant effect on the level of investment as it increases investor confidence in a particular county while political instability could discourage the level of investment and growth in an economy. The estimate of political stability equally suggests that a more stable political framework increases business confidence thus stimulating economic activity. In a more stable political environment trade and investment are strongly encouraged improving the degree of technical efficiency in national production. This finding is consistent with the submission of Asiedu (2000) and Abeyasinghe (2004).

The Rule of Law indicator has a positive and significant relationship with output, meaning that the economies that adhere to rule of law will have a higher output per worker. More recently, all countries in Sub-Saharan African countries are improving their judicial institutions because rules are absent, rules are suboptimal, or useful rules are poorly enforced. For instance, constitutions

abound in Africa, but many are ineffective. Nearly all the countries in this region have one problem or the other ranging from terrorist attack in Nigeria, Niger, and Cameroon and flagrant disobey of court orders by government in Zambia, Uganda and Mali. African courts generally work less reliably, the legal process often involves long delays, and most judicial officers appear to be moderately knowledgeable about the law. Our findings indicate that most governments in these countries believe the presence of clear protection of property rights and strict adherence to rule of law is the key element in the institutional environment that shapes economic performance and improves output per worker.

The regulatory quality variable has a negative and significant relationship with output suggesting that many of the countries in Sub-Saharan Africa formulate and implement policies and regulations that do not permit and promote private sector development. It also suggests that market-unfriendly policies such as the price controls or inadequate bank supervision, as well as excessive regulation in areas, such as foreign trade and business development.

4.5.1. Additional policy influences on Output

Aside from the institutional factors that are likely to have an impact on output per capita by influencing the efficiency with which product and labour market operate; foreign direct investment (FDI) will also have significant influence on output per capita in SSA economy. FDI is a composite bundle of capital stock, know-how, and technology, which can augment the existing stock of knowledge through labour training, skill acquisition and diffusion to the domestic economy.

Theoretically, FDI in the neoclassical growth model promotes economic growth by increasing the volume of investment and/or its efficiency. In the endogenous growth model, FDI

raises economic growth by generating technological diffusion from the developed world to the host country (Borenztein, Gregorio and Lee, 1998; Li and Liu, 2005).Table 4.7 presents the regression results of the log of GDP per capita on FDI, and the interaction between FD1 and the institutional variables.

Table 4.7: Output and FDI and Interaction terms, Dependent Variable: GDP per capita

Variables	Fixed Effect Estimation
FDI	0.008***
	(4.72)
FDI*Corruption	-0.02***
	(-3.80)
FDI*Government effectiveness	0.0002
	(1.24)
FDI*Political Stability	0.002***
	(3.96)
FDI*Rule of law	-0.002***
	(-2.62)
FDI*Regulatory quality	-0.0005
	(-0.86)
Diagnostic Test	
R-Square	0.38
No of Observations	1311

*Notes: GDP per capita is the output over four decades. Numbers in brackets below coefficient refer to t-statistics. Asterisks denote significance as follows, *** at 1%, ** at 5% and * at 10%. Robust standard errors were used in obtaining these t-statistics. The estimator used in this specification is fixed effect method.*

FDI variable only exerts a positive effect on output per worker. This result indicates FDI is an important vehicle for the transfer of technology, contributing in larger measure than the domestic investment (see Borensztein et al., 1998). FDI also increases the rate of technical progress in the host country through the "contagion" effect of the more advanced technology,

management practices etc. On the basis of this assertion most countries in Sub-Saharan African economy has relied on FDI inflows because of its acknowledged advantages.

The interaction of FDI and corruption has a negative sign, meaning that a high level of corruption is likely to attract low-technology, resource exploiting FDI, with limited growth potential. Countries produce high levels of output per worker in the long run if they invest in inputs with a high level of productivity. Although economic theory is ambiguous on the ultimate effects of corruption on FDI, it does propose several different mechanisms that can discourage FDI, including corrupt institutions acting as a tax on investment and heightened insecurity and uncertainty (see, for instance, Wei (2000) and Wijeweera (2010)).The interaction of FDI and rule of law variables has negative sign which is suggestive of the fact that the incidence of crime is very high in SSA countries and this will serve as deterrent to foreign investors. The interaction of FDI and political stability show that foreign investors are highly sensitive to changes in political stability and a framework in which governments operate. Fundamental democratic rights, like civil liberties and political rights do matter to multinationals operating in developing countries, when we control for other factors that affect FDI flows.

Therefore, it can be argued that institutional quality clearly modulates the effect of FDI on economic growth in SSA countries. Therefore, a favourable institutional environment induces a growth enhancing effect. Promotion policies targeted to attract FDI will have no benefit for host countries unless there is an improvement of their institutional framework.

4.5.2 Controlling for Endogeneity

This subsection will verify whether the results obtained in the previous section are robust to controlling for endogeneity. It is not known whether institutions cause development or development implies better institutions. Countries with higher per capita income might, for instance, develop better ways to protect private property, sound rule of law and, therefore, adopt better institutions. Therefore, an OLS procedure might yield biased estimates on the effect of institutions on development. There are numbers of obvious potential problems with the OLS regression. First is the endogeneity of the institutional measurement. Increases in income may lead to a demand for and realisation of better institutions. Also, all the institutional measures are subjective and this may bias our estimates. Second, there is likely to be a considerable measurement error in our measurement of institutional quality. Third, there are likely to be many omitted variables possibly correlated with both GDP per capita and institutional quality in the OLS estimates. A key issue with using 2SLS is to identify appropriate instruments that are correlated with the endogenous variable, institutions in this case but being uncorrelated with the error term. Among the variables being considered as valid instruments for institutions are ethno-linguistic fractionalization, distance to the equator across countries (Mauro 1995, Hall and Jones 1999, Acemoglu et al 2001).

This study use a set of two instruments, the share of the population in Sub-Saharan Africa countries that speaks English, the share that speaks a major European language and climatic conditions (following Hall and Jones, 1999 and Dollar and Kraay, 2003). These instruments capture the influence of colonial origin on current institutional quality. The choice of these instruments was based on two plausible reasons. First, Western Europeans were more likely to settle in areas with similar climate to Western Europe, which again points to the regions far from the equator. Second, Europeans colonizers did seek to conquer and exploit areas of the world that

were rich in natural resources such as oil, gold and silver and nearly all the countries in Sub-Saharan Africa has this feature.

The study uses dummy variable with value 1 if the country was colonised by Britain and the English legal code was transferred and 0 if the country was colonised by another major European country and their legal code was transferred an a dummy variable with value 1 if the country is an oil producer and 0 otherwise.

Table 4.8: IV Results, *Two-stage least squares*: Dependent Variable: *GDP per capita*

Variable	***(1)***	***(2)***	***(3)***	***(4)***	***(5)***
FDI	0.007***	0.02***	0.13***	0.12***	0.02***
	(1.87)	(6.94)	(4.81)	(3.05)	(5.81)
ln(*hum*)	0.55***	0.56***	(0.56)	0.44***	0.56***
	(14.59)	(20.99)	(16.74)	(8.70)	(19.46)
ln(*n+g+d)*	2.13***	2.64***	2.87 ***	3.13***	2.56***
	(3.89)	(7.25)	(6.16)	(5.91)	(6.44)
Corruption	0.69***				
	(4.39)				
Gov effectiveness		0.38***			
		(4.76)			
Political Stability			0.26		
			(1.52)		
Rule of Law				-0.63	
				(-2.84)	
Regulatory quality					0.46
					(4.78)
No. of Observations	1312	1312	1312	1312	1312
R^2	0.48	0.48	0.48	0.59	0.38

*Notes: The dependent variable is per capita GDP. All regressors are expressed in logs. The instruments for indicators of institution are language and oil. . Numbers in brackets below coefficient refer to t-statistics. Asterisks denote significance as follows, **** at 1%, ** at 5% and * at 10%.*

Table 4.8 presents the results of the instrumental variables (IV) estimation. The instruments for institutions and integration are sensible, and have been demonstrated to work (Hall and Jones; Dollar and Kraay, 2003; Alcala and Ciccone, 2004) in the sense of producing strong second-stage results. The results in Table 4.8 show that the 2SLS coefficients are generally similar to those of OLS procedure. The institution measure in Column 1 shows a positive significant relationship with GDP per capita. The result, it's not surprising, corruption in Sub-Saharan African countries is "endemic" as such corrupt practices such as speed money would enable individuals to avoid bureaucratic delays. Previous studies have argued that corruption may raise economic growth through two types of mechanisms. First, corrupt practices such as "speed money" would enable individuals to avoid bureaucratic delay. Second, government employees who are allowed to levy bribes would work harder, especially in the case where bribe acts as piece rate. Treisman (2007) documents the evidence that some countries seem to have grown rapidly in recent decades despite the perception that their states were highly corrupt, for example, China, South Korea, Thailand, India and Indonesia. Columns 3 of the table present the result of Political instability variable which equally has a positive and significant relationship with GDP per capita growth. Political instability has become a big problem for nearly all countries in Sub-Saharan Africa. The region has been far more subject to coups than other regions (Collier and Hoeffler, 2005). Political instability in Africa has been tactically influenced by the 'Big economic powers' like China, Russia, America and Europe who provide a haven for stolen funds by African political leaders. The suggested plausible reason for this observation is that investments in Sub-Saharan African (being mostly in extractive sector) are so profitable that the return after adjusting for risk is quite substantial; hence the investors could not be discouraged by political instability and non-adherence to the rule of law.

The results are robust to the inclusion of the identity of colonizer and natural resources a country has. La Porta et.al. (1999) argue that the type of legal system historically adopted in a country or imported through colonization has an important bearing on the development of institutions and hence on GDP per capita. The argument advanced in this paper is that a large population made it profitable for the Europeans to set up extractive institutions, with political power concentrated in the hands of a small elite. Europeans were more likely to set up extractive institutions in places they did not settle, high population density also made the development of institutions of private property less likely. In countries where the colonizers encountered relatively few health hazards to European settlement, they erected solid institutions that protected property rights and established rule of law. In other areas, their interests were limited to extracting as much resources as possible, and they showed little interest in building high-quality institutions. And in nearly all the countries in Sub-Saharan African countries the colonizers were interested in extracting their resources and not interested in maintaining quality institutions.

4.6: Conclusions

This study has used a newly assembled data set consisting of historical indices to provide empirical evidence on the variation in the levels and rate of growth of output across countries. Our results indicate that the augmented model is consistent with the international evidence and that difference in physical capital accumulation, education attainment, and institutional quality should explain cross-country differences in output per worker and income per capita in Sub-Saharan African countries. The examination of the data indicates that standard input and the institutional quality variables do explain most of the variation in these countries.

Using recently developed instruments for institutions and trade. The results point that Sub-Saharan African countries tend to have corrupt, cumbersome bureaucracies and to be politically unstable due to poor rule of law. This may have played a considerable role in bringing about low output and productivity growth, thus leading to poverty. This finding holds in OLS, LSVD and FE, settings. In order to check the robustness of our results, we also run the log of GDP per capita on institutions and other additional control variables as suggested by Easterly and Levine (2003). We observe that the sign and statistical significance of all coefficients on measured institutions are robust to the introduction of additional control variables. A consistent finding of two decades of economic research is that institutions matter for economic growth (Acemoglu, 2009; Andersen and Jensen (2013).

The results have three policy implications. First, the policy makers in Sub-Saharan Africa should strive hard to maintain better institutions as this will encourage entrepreneurs to invest in both physical and human capital. Second, a related issue of the business environment is the importance of consciously curbing corruption in this region. Agencies should be established to

fight corruption so as to convince both foreigners and nationals that the region is a safe place to invest. Finally, the government should find a lasting solution to political tensions, conflicts and risks of terrorist attacks as this has served as deterrents to foreign investments in those regions. The empirical findings in this study suggest a partial explanation for the stylised fact that poor countries tend to have corrupt, cumbersome bureaucracies and to be politically unstable. As institutional inefficiency persists over time, the bad institutions in the past may have played a considerable role in bringing about low output and productivity, thus leading to poverty today.

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Appendix

Table 4.1: The dimensions of governance from Kaufmann et al. (2004)

Variable	Description	No of Obs.
Political stability and absence of violence	It measures perceptions of the likelihood that the government in power will be destabilized or overthrown by possibly unconstitutional and/or violent means, including domestic violence and terrorism	140
Government effectiveness	In constructing this index, the authors combine responses on the quality of public service provision, the quality of bureaucracy, the competence of civil servants, the independence of civil from political pressures, and the credibility of the government's commitment to policies.	140
Regulatory quality	It is more focused on the policies themselves. It includes measures of the incidence of market-unfriendly policies such as price controls or inadequate bank supervision, as well as perceptions of the burdens imposed by excessive regulation in areas such as foreign trade and business development.	140
Rule of law	It means the extent to which agents have confidence in and abide by the rules of society and it includes perceptions of the incidence of crime, the effectiveness and the predictability of the judiciary, and the enforceability of contracts. These indicators measure the extent of protection of property rights and also the success of a society in developing an environment where fair and predictable rules form the basis of the economic and social interactions.	140
Control of corruption	It measures perceptions of corruption, conventionally defined as the exercise of public power for private gain. According to their definition, the presence of corruption represents a failure of the governance.	140

Source: Kaufmann et al. (2004)

Table 4.2: Determinants of quality of governments from La porta et al., (1999)

Variable	Description and source	No. of obs.
Property Rights index	A rating of property rights in each country (on a scale from 1 to 5). The more protection private property rights receive, the higher the score. The score is based, broadly, on the degree of legal protection of private property, the extent to which the government protects and enforces laws that protect private property, and the country's legal protection to private property. *Source: 1997 Index of Economic Freedom*	149
Business Regulation Index	A rating of regulation policies related to opening a business and keeping open a business (on a scale from 1 to 5). Higher score means that regulations are straight-forward and applied uniformly to all businesses and that regulations are less of a burden to business. *Source: 1997 Index of Economic freedom.*	149
Corruption	Corruption in government index. Low ratings indicate "high government officials are likely to demand special payments" and "illegal payments are generally expected at lower levels of government" in the form of bribes connected with import and export licenses, exchange controls, tax assessment, policy protection, or loans". Scale from 0 to 10. Average of the months of April and October in the monthly index between 1982 and 1995.	126
Bureaucratic delays	An indicator of bureaucratic delays (red tape). Low ratings indicate lower levels of red tape in the bureaucracy of the country. Scale from 0 to 10. The index is published three times per year. The data are the average over the 1972-1995 periods. Source: Business Environmental Risk Intelligence's *(BERI) Operation Risk Index.*	60

Source: La Porta et al. (1999)

Table 4.3: List of Variables, Description and Data Source

Variable	Description	Source
GDP per capita	Real Gross Domestic product per Capita in 2000US$ constant prices	WDI (2011)
Corruption	Measure the extent to which public power is exercised for private gains and capture of the state by elites and private interest.	WDI, IMF ,ADB (2012)& UNECA (2012)
Government effectiveness	Measure the quality of public services, the quality and quality of policy formulation and the credibility of the governments' commitment to such policies.	WDI (2011), IMF (2011), ADB (2012) & UNECA (2012)
Political stability	Measure the likelihood that government will be destabilized or overthrown by unconstitutional or violent means including domestic violence or terrorism.	WDI (2011), IMF (2011),ADB (2012) & UNECA (2012)
Rule of Law	It measures the extent to which agents have confidence in and abide by the rules of society.	ADB & UNECA (2012) WDI, IMF
Regulatory quality	Measure the ability of the government to formulate and implement sound policies that promote private sector development.	IMF, WEO
Human capital	It measures approximately the percentage of the working-age population that is in secondary school.	WDI (2011) & ADB (2012)
Population growth	The annual growth rate of working age population	WDI (2011)
Physical Capita accumulation	Gross fixed capital formation as a share of GDP.	WDI (2011)
Infrastructure	Number of telephone mainlines per 1000 population	WDI & IMF

Openness	This is calculated as the ratio of exports plus imports over Real GDP	WDI, IMF
FDI net inflows as % of GDP	Weighted Average net inflows(New investment inflows less disinvestment) as % GDP	WDI, IMF

Table 4.4.: The Correlation matrix for institutional efficiency index

	Corruption	Govteffect	Polstab	Rule of law
Govteffect	0.4212			
Polstab	0.2126	0.2839		
Rule of law	0.2423	0.3355	0.2066	
Regquality	0.5488	0.7198	0.2895	0.3193

Note: All correlations reported relate to averages for the entire period 1970-2010.

CHAPTER 05

THE ROLE OF POLITICAL AND ECONOMIC INSTITUTIONS ON NATIONAL EFFICIENCY: EVIDENCE FROM SUB-SAHARAN AFRICA (SSA)

5.1: Introduction

Trade openness is regarded among the most crucial factors for stimulating growth, see country level evidence for the trade growth relationship in Edwards (1998), Harrison and Hanson (1999), Frankel and Romer (1999) and Dollar and Kraay (2003). Trade is beneficial for growth as it enhances both static and dynamic gains. The former group includes the reallocation of scarce resources towards more productive activities, which in turn improves welfare and country's overall level of efficiency. As dynamic trade gains are mainly highlighted the existence of learning effects and knowledge spillovers. This type of gains mainly impact on domestic economic efficiency[27] due to positive externalities generated from contacts with international best practices. Ina Sub-Sahara African context, the expansion of productive capacity through trade is of vital importance given the limited capabilities and the status of underdevelopment in these countries (Rodriguez and Rodrick, 2000; Johnson et al., 2010; Vogel and Wagner, 2010). Additionally, trade and export in particular provide to these countries the potential of market expansion, especially when the domestic economic environment is so heavily distorted (i.e. a large number of trade restrictions) and with weak purchasing power (World Bank, 2011).[28]

[27] For example, see firm level studies for the export-efficiency nexus in Bernard and Wagner, 1997; Bernard and Wagner, 2004; Bigsten et al., 2000 and Kraay, 2002. This evidence shows that export orientation of firms further contributes to firm's productivity growth.

[28] The World Bank report s reveals that country's in Sub-Saharan Africa take an average of 33.6days to export and 39.4days to import and costs of exporting and importing in Sub-Saharan Africa is more than twice that of any OECD countries.

The role of institutions on growth has been extensively investigated in the growth literature with the results to suggest the importance of good quality institutions for the long term growth of developing nations (Rodrik, 2004). A voluminous number of studies show that institutions have a substantial effect on per capita income and economic development (North, 1990; Hall and Jones, 1999; Easterly and Levine, 2001; Cavalcanti, Magalhaes and Tavares, 2007). Indicatively, Acemoglu, Gallego, and Robinson (2014) have concluded that institutional quality account for as much as 75% of the variation in income levels around the world. The main message from these studies is that countries with better institutions not only invest more in physical and human capital (Cavalcanti and Novo, 2005; Daniele and Marani, 2005), but also tend to use these factors more efficiently. The elaboration of institutions in this strand of literature has been mainly implemented within the framework of growth regressions, which can provide intuitive results nevertheless this approach is subject to some empirical limitations. We refine this approach to incorporate institutions within a stochastic frontier analysis, which seeks to identify not only if better institutional performance can generate higher income, but more importantly, whether institutions can affect country's distance from the frontier. This approach overcomes certain difficulties encountered when one models institutions as factors of a standard growth framework (Madden et al., 2001; Madsen et. al., 2010)[29], as it permits to assess the role of institutions in a country's attempt to achieve optimal production given the amount of inputs available. This is the concept of technical efficiency on which institutions supposedly play a key role as they largely determine the allocation of the limited resources.[30]

[29] The use of SFA allow for the identification of production-unit and time specific efficiency effects.

[30] At the national level, allocative and technical inefficiency can be caused from a composite of factors related to the usage of the resources and they all associated with the under-utilisation of productive capacity. Among of the most representative factors that lead to inefficiency are institutional failures that almost directly impact on the efficient use of labour and capital. Our analytical framework endeavours to identify the sources that can potentially reduce the loss of national income due to inefficiencies (i.e. better quality institutions, more trade orientation, human capital and FDI).

Endogenous theories of economic growth have attributed to human capital and FDI important roles in the growth process[31]. The accumulation of human capital as measured by the average years of schooling or the share of employment with a University degree can increase innovation rate as well as can improve absorptive capacity with more effective utilisation of technological advancements already produced elsewhere. The social return to education is large highlighting primarily the existence of numerous positive externalities; which collectively contributes to higher levels of income per capita. In a similar line of argument, FDI is another way path to improve physical capital deepening, which is regarded as one of the main drivers of output per worker in the Solow model. In addition to this, foreign investment is a conduit of technology and knowledge transfer. As already discussed in the present thesis, foreign owned firms may possess better management techniques and more advanced know-how from which domestic producers can learn in order to improve their own performance. Following the previous discussion, human capital and FDI recognised as central factors to our analysis in determining a country's position relative to the frontier.

The effectiveness of human capital, trade and FDI vastly depends on the existing institutional set-up. For instance, the quality, of education provided in Sub-Saharan African countries is inseparable from the strength of property rights in the region. Firms might not have strong incentives to invest in training and education of their personnel without the existence of strong property rights legislation environment. Therefore, there might be members of the labour force that have attained the typical skills, although their real job competencies might be weak without improving productivity.[32] Similarly, there is conditionality in the effectiveness of FDI as

[31] See Krueger and Lindahl, 2001for a review about the role of Human capital on the empirics of growth.
[32]Obwona, (2004) and Ayanwale, (2007) argued that one of the conditions for location of efficiency-seeking FDI is that there is ample supply of skilled labour but noted that although labour appears to be cheap in Africa, there is nonetheless an overall shortage of skilled labour on the continent.

the indebtedness of the foreign enterprises is analogous to the quality of institutions in the host country. In countries without well-functioning institutions or massive political instability, foreign investors act opportunistically seeking to reap short-term benefits from from their economic activity in the local economy (i.e. exploitation of natural resources, preferential tax treatment from a particular government, etc.) without establishing a long term presence in the host country.

One can easily infer from all previous considerations that the interplay between institutions, human capital, trade and FDI is rather crucial and it should not be neglected from the efficiency puzzle of less-developed countries. The primary focus of the present chapter is to investigate the various institutional channels through which, human capital, trade and FDI can maximize performance of SSA countries, which is to decrease inefficiency moving thus the country closer to the technical frontier. Our approach is to use a wide range of institutional factors, broadly classified as political and economic institutions. The former group includes, for example, institutional aspects that represent the level and the quality of democracy while the latter group refers to more specific economic factors that can be potentially equally important for trade performance and FDI. The set of political institutions is a newly assembled dataset that covers virtually the entire SSA countries for the longest possible period 1970-2010 that data can be found[33]. The methodological framework of the study is a panel stochastic frontier for 32 SSA countries.

The contribution of the present chapter to the literature is threefold. First, studies in the ternary system of trade, growth and institutions employ simple measures of income per capita, which entails a number of inherited endogeneity difficulties before obtaining consistent and

[33]The data for political institutions variable are scanty in World Bank, development indicators and so many missing variables as such the series were carefully assembled over the past years from different sources (See Appendix A) over a long period of the programme from London School of Economics Library.

reliable estimates. An additional issue with this approach is the absence of any identification about the way factors of production combined at a given level of technology. This is an efficiency issue and can be more appropriately addressed with an SFA approach as it will be implemented in this study. Second, this study addresses the issue of conditionality as far as trade, human capital and FDI are concerned. It should be misleading to expect that higher levels of education or trade orientation will a priori bring more efficiency. This will always depend on the degree of institutional quality in the country under consideration. Third, due to data limitations in developing countries, studies regarding the source of efficiency is referring mainly to developed countries (Lall and Pietrobelli, 2002; Kneller and Stevens, 2003; Henry *et al.*, 2009; Montinari and Rochlitz, 2012).[34] The empirical evidence of the present chapter has a clear focus on developing nations whose place are by default far behind the international technological frontier. Therefore, there is enough space for efficiency improvements and thus great scope to explore the mechanism through which improvements can be achieved.

The rest of the study is organised as follows: Section 2 discusses the key characteristics of Sub-Saharan African countries and survey key studies in the literature of institutions, trade, human capital and growth. Section 3 presents the general theoretical framework. Section 4 discusses the data set used in the empirical analysis. Section 5 outlines the methodology upon which the study is based. The results of the empirical analysis from the frontier are presented in Section 6. The last section contains the concluding remarks.

[34] Studies on individual case studies for Sub-Saharan African countries include: Harrison (1994) for Cote d'voire, Clerides et al., (1998) for Mexico, Colombia and Morocco, Bigsten et al, (1999) for Cameroon, Ghana, Kenya and Zimbabwe, Van-Biesebroeck, (2003) for Burundi, Cameroon, Cote d'Ivoire, Ethiopia, Ghana, Kenya, Tanzania, Zambia, and Zimbabwe.

5.2: Survey of the Literature

There is now considerable evidence that trade liberalization has played a leading role in the growth process (Roberts and Tybout (1996), Bernard and Jensen (1999), Alvarez and Lopez (2004), Van Biesebroeck (2006) and De Loecker (2007)). It is this empirical finding that is often cited as an argument for active export promotion in many developing countries. As already mentioned, trade openness is associated with static gains from economies of scale due to market expansion. These efficiency gains contribute to better allocation of resources leading to lower unemployment and faster growth rates ((Grossman and Helpman 1991, Agosin 1999 and Giles and Williams 2000).Mastromarco (2002) and Kneller and Stevens (2006) find that the degree of trade openness is positively associated with efficiency in a group of developing countries. On the other hand, Fu (2005) within a very similar analytical framework finds no evidence between exports and productivity gains in China, highlighting the existence of heavy distortions and the presence of market imperfections in the domestic market that hamper any potential gains from exporting.

Several studies have examined the impact of different aspects of institutions or governance on economic growth and performance. The general wisdom is that politically stable economies are more efficient and grow faster. The mechanisms identified in the literature associate political stability and security of property rights with higher investment and growth (Barro (1991, 1996)). Other measures of institutional quality include government effectiveness, bureaucratic honesty, contract enforcement and rule of law. The use of these indices seek to reveal whether better institutions contribute to grow faster via a more efficient use of the existing resources. The evidence is supportive to the positive nexus between growth and institutions (Mauro (1995), Knack and Keefer (1997), Rodrik et al. (2004), Kaufmann et al., (2009) and Akinlo (2011)).

These findings suggest that cross-country differences in productive efficiency are the results of better functioning institutional environment.

Zhang, Jiang and Wang (2014) find that innovations through technological advancement are the primary source of productivity growth through improving products and/or production processes. They find evidence that technological advancements may push up the production frontier and/or improve efficiency by reducing production costs. This view is supported by empirical findings from the endogenous growth model (Romer, 1990; Mankiw, Romer and Weil, 1992 and Benhabib and Spiegel, 1994) which assumes a strong knowledge spillover effect from innovation through technology.

Economists are increasingly aware of the deep links between human capital and efficiency (Griffith et al., 2004; Kneller and Stevens, 2006; Mastromarco, 2008; Breznitz and Murphree, 2011; Christopoulos and McAdam 2015) among others, all provide empirical evidence supporting the view that a highly skilled economy allows the workforce to implement and absorb new technologies and catch up with technological frontier. The extent to which depends on its quality, appropriateness and externalities induced by skills. Christopoulos and McAdam (2015) argued that human capital may affect efficiency through demonstration, effects, complementarities and diffusion process also induced by skills.

In recent years, developing countries have increasingly relied on private capital as a source of funding. Since the early 1990s, private sources of funding have made up over 75% of their extent of capital flows (Reiter and Steensma, 2010). The major sources of this private funding have consistently been foreign direct investment (FDI). Policy makers believe that FDI is an important element in the growth process of developing countries. There are documented empirical evidence

on the relationship between FDI and economic growth, however the results vary widely; Bwayla (2006) found that there were significant technology spillovers from firms in upstream sectors to local firms in the downstream sectors in manufacturing industries in Zambia. Hence FDI can be important vehicle for the transfer of technology to certain local firms and for increasing the overall competitiveness of the industry, which will have positive effect on economic growth (Borenztein et al., 1998). Again it can be argued that, FDI may crowd out local enterprises and actually be detrimental to economic growth. Foreign enterprises are often significantly superior to domestic enterprises and either buy out or drive out domestic firms, leading to a concentration of power in the industry (Blomstrom & kokko, 1996; Aitken & Harrison, 1998; Agosin& Mayer, 2000).

5.3: Model Specification

This section presents the model specification and the empirical strategy used to analyse the determinants of technical inefficiency in SSA countries. The frontier approach was initially developed by Farrell (1957) and measures technical inefficiency of production as the distance of each production unit to its optimal level. The frontier level of production is defined as the maximum level of output that a country can produce given the state of technology and the mix of production inputs. The greater the distance from the frontier, the higher is the degree of technical inefficiency.Aigner et al. developed (1977)[35] a stochastic version of this model and Schmidt and Sickles (1984) adopted this into a panel context. The stochastic frontier model is written as:

$$Y_{i,t} = f(\mathrm{X}_{i,t}, T_t, C_i)e^{\varepsilon_{i,t}} \tag{5.1}$$

Where Y is real GDP in country i at year, t, X is vector of standard production inputs currently including the following $\mathrm{X} = [K_{i,t}, L_{i,t}, H_{i,t}]$ with *K, L, H* to denote capital stock, labour and human capital. The production function also includes a time trend T_t that captures exogenous technical change. The error term of the production function is decomposed as follows:

$$\varepsilon_{i,t} = \upsilon_{i,t} - u_{i,t} \tag{5.2}$$

The Term $\upsilon_{i,t}$ represents the standard statistical disturbance of the frontier while $u_{i,t}$ is a non-negative stochastic term that is associated with the technical inefficiency of production in country i at year *t*. $f(\cdot)$ is the production frontier that can vary over time and countries, shifts in $f_{it}(\cdot)$ overtime reflect technical change. The trade-off in selecting the appropriate empirical specification of (5.1) is between alternative a homogenous production function versus a model

[35] Applications of SFA can be found in Koop et al., (1999), Kneller and Stevens (2006) and Christopoulos and Leon-Ledesma (2014).

that controls for country heterogeneity. The current specification follows Greene (2005) allowing for country fixed effects, attributing to potential inefficiency time-varying factors such as political and economic institutions.[36]

Turning to the truncated at zero technical inefficiency term, $u_{i,t} \geq 0$, it is assumed to be independently distributed with mean, μ and constant variance, $N^{+} \square (\mu, \sigma^2)$. Then, the mean level of inefficiency is described as follows:

$$\mu_{i,t} = \mathbf{Z}_{i,t}\delta \tag{5.3}$$

where $\mathbf{Z}_{i,t}$ is a vector of factors associated with technical inefficiency of production and δ is a vector of unknown coefficients to be estimated.[37]

We approximate (5.1) with a standard Cobb-Douglass function as follows:[38]

$$\ln Y_{i,t} = \beta_{0i} + \sum_j \beta_j \ln X_{ji,t} + \gamma T + \upsilon_{i,t} - u_{i,t} \tag{5.4}$$

With $i = 1, ..., N$ to index countries and *j*, *k*=*L*, *K*, *H* to index production inputs.

The fixed effects model specified in (5.4) relies on three assumptions: (a) $[X_{ji,t}, \upsilon_{i,t}, u_{i,t}]$ are mutually uncorrelated (b) the terms $\upsilon_{i,t}$ and $u_{i,t}$ follow normal and half-normal distributions, respectively and (c) the inefficiency term u is time variant. Finally the country heterogeneity is captured from β_0. The time-variant inefficiency term is now modelled as follows:

[36] The inefficiency term also includes some other standard covariates that are expected to impact on national inefficiency.

[37] Battese and Coelli (1995) specify the technical efficiency term defined as: $TE_{i,t} = \exp(-u_{i,t}) = \exp(-z_{i,t}\delta)$. In our study we estimate technical inefficiency so results should be interpreted accordingly.

[38] Recent evidence from Duffy and Papageorgiou (2000), Klump et al. (2007) and Leon-Ledesma (2010) reject the restrictive Cobb-Douglas function previously used in Lovell et al. (1992) and Bigsten et al. (2000) in favour of more flexible forms of production functions.

$$
\begin{aligned}
u_{i,t} = \gamma_0 + \gamma_1 H_{i,t} + \gamma_2 Trade_{i,t} + \gamma_3 FDI_{i,t} + \gamma_4 \sum_{P=1}^{4} \mathbf{Political}_{i,t} + \gamma_5 \sum_{E=1}^{3} \mathbf{Economic} + \gamma_6 \xi + \\
\delta_1 H_{i,t} \times \sum_{P=1}^{4} \mathbf{Political}_{i,t} + \delta_2 H_{i,t} \times \sum_{P=1}^{4} \mathbf{Economic}_{i,t} + \\
\delta_3 Trade_{i,t} \times \sum_{P=1}^{4} \mathbf{Political}_{i,t} + \delta_4 Trade_{i,t} \times \sum_{P=1}^{4} \mathbf{Economic}_{i,t} + \\
\delta_5 FDI_{i,t} \times \sum_{P=1}^{4} \mathbf{Political}_{i,t} + \delta_6 FDI_{i,t} \times \sum_{P=1}^{4} \mathbf{Economic}_{i,t} + \omega_{i,t}
\end{aligned}
\tag{5.5}
$$

Where γ_0 is a constant term, *H*, is a measure of human capital,[39] *Trade* measures trade openness, *FDI* is the share of inward FDI. The two vectors Political and Economic include political and economic institutions, respectively. Finally, we also include a vector ξ with other inefficiency determinants such as the share of manufacturing output in GDP and a time trend to capture effort and learning by doing effects in national production. Parameters δ capture the interaction effect between institutional variables and human capital, FDI and trade. The term ω is a stochastic random variable distributed as: $N^{+}(0, \sigma_w^2)$ to satisfy that *u* is a truncated positive number. Parameters γ and δ are to be estimated in a one step process alongside with the estimation of the frontier production function (5.4).

5.3.1: Data Issues

A Simple Background of Sub-Saharan African Economies

[39] Christopoulos and Leon-Ledesma (2014) follow a similar modelling strategy including human capital both as a production input and as an inefficiency determinant. Our interpretation for including human capital in both (5.4) and (5.5) is justified on the basis that we search for synergies between human capital and institutions.

Sub-Sahara Africa is mainly specialised in primary commodities. The manufacturing sector in SSA is still in its infancy with a limited contribution to the overall economy. The main reason for the under-development of the manufacturing sector is the commitment to crude oil exports, institutional inefficiencies and lack of finance. The manufacturing sector accounted 9% of GDP in SSA in the 1960s and this percentage has slightly increased to 11%, over a period of 30 years (Van Biesebroeck, 2005). On the other hand, the manufacturing employment share is relatively larger, indicating an issue of low productivity of the sector. Labour costs are low, but not nearly as low as in most other emerging markets, and the cost of transport, communication and the general standard of living is much higher in SSA than in emerging economies**.** The major trading partner for all SSA countries is Europe; other important partners are Japan, USA and Middle East countries. The chances of intra-industry trade in Sub-Sahara are limited due to cross-country specialization in very similar products. The lowest degree of product differentiation is mainly resulted from the low levels of human capital in the area as well as the low degree and technological sophistication in the commodities traded.

All SSA countries adopted import substitution development policies from their independence through the late 1970s. In the mid to late 1980s, they had all introduced 'structural adjustment' programs with the support of the World Bank with emphasis on macroeconomic reforms, trade liberalization and privatizations.[40]These reforms did not work well because the basic market structure and infrastructure were inadequate or even non-existent to support these reforms. Certainly, the absence of quality institutions and good governance is also factors that led to poor results from the implementation of market oriented policies and thus fail to promote faster economic growth (Collier, 2007; Brixiova and Ndikumana, 2010).

[40] The scope and success of these programs varied. For a discussion of policy reforms in these countries see Bigsten*et al*. (199a, 1999b).

Definitions of Variables

This study uses an unbalanced panel of 32 African countries for the period 1970-2010. Starting from the variables included in the production function, Output is the real GDP expressed in constant 2000 USD, labour input is the number of workers engaged and capital is a measure of capital stock expressed in constant 2000 USD. The study briefly outline the content of each variable here, a more detailed description can be found in Appendix Table 5.1.

Data on GDP per capita and capital stock were taken from World Bank's Development Indicators (WBDI). Data on manufacturing export share and manufacturing, value added as a share of GDP are taken from World Bank national accounts data and OECD national accounts data files. When gaps in the data were evident in some of the countries; we tried other sources such as: the United Nation National Accounts (Main Aggregates Database) and African Development Bank (ADB database). We capture absorptive capacity of Sub-Saharan African countries using capital stock measured by machinery imports. Imports are conduits that already embody foreign knowledge and technological know-how. The use of this variable implies the greater the level of imports the greater the scope for absorption of foreign innovations (Henry, Kneller and Milner, 2009; Griffith et al., 2005).To capture the degree of domestic imitation, we use two variables FDI and human capital. FDI is used instead of innovation data that are not in existent for Sub-Saharan countries. FDI data are taken from various issues of the International Monetary Fund and International Financial Statistics. Human capital is measured by mean years of schooling in the population aged 15 and over is taken from Barro and Lee (2000). Trade openness is the share of exports plus imports to GDP (WBDI and ADB databases).

The study classifies its institutional variables into two parts, political and economic; the political variables included are the rule of law, political stability, government effectiveness and

corruption. The rule of law captures the extent to which foreign investors have confidence in the rules of the country. The political stability measures the likelihood that the government in power will be destabilised by unconstitutional means, including domestic violence and terrorism. The government effectiveness indicator, indicate the ability of the government to formulate policies that are expected to improve countries' efficiency performance and promote productivity growth and corruption measures the extent to which public power is exercised for private gains. Data for the political, institutional variables for these countries were assembly from various sources over a long period of time from the London School of Economics Library. The data sources include WDI Various issues, WEO (IMF), ADB *data base*, UNECA *database*, World Bank, Doing business report various issues, World Economic Forum, *Global competition report* and PRS Group, International Country Risk Guide.

The economic institutional variables are indices taken from the Economic Freedom of the World (EFW) (Gwartney and Lawson, 2003). The economic freedom index consists of five main components and 42 sub-components that cover various aspects of the economic activity. The study considers three of the main economic freedom components making sure these are not overlapping with our political institutions variables. Precisely, we use the following indices: (a) Size of Government; (b) Sound Money; and (c) Regulations.[41]. Index (a) represents whether government interferes in the economic activity causing distortions in the operation of the private sector of the economy, (b) refers to the reliability of the monetary authority in the country and (c) measures the degree of market protection and regulation in the economy. These indices are ranked from 0-10 with values closer to the upper bound indicating a greater degree of freedom in the related area. More detailed definitions of the economic institutional variables can be found in

[41]There are 24 components in the index. Many of these components are themselves made up of several sub-components. In total the index comprises 42 distinct variables, each components and sub-components is placed on a scale from 0-10 that reflects the distribution of the underlying data.

Appendix Table 5.1. Appendix Table 5.2 reports the correlation matrix for the variable. As shown by the Table, multicollinearity is no longer concern with weakly correlated regressor. Table 5.3 presents descriptive statistics of all variables using data for the period (1970-2010).

Table 5.3: Summary statistics of Key variables

Variable	Observations	Mean	Std. Deviation	Minimum	Maximum
LnY	1271	8.82	1.38	5.44	12.88
LnL	1271	0.74	1’34	-2.72	3.89
LnK	1271	9.87	1.28	6.80	13.75
LnH	1269	-3.48	1.99	-9.19	2.09
Rule of Law	1271	1.80	1.01	0.04	5.73
Political Stability	1271	1.79	1.17	0.008	5.9
Gov effectiveness	1271	1.99	1.27	0.01	5.87
Corruption	1271	1.98	1.26	0.01	5.90
FDI	1271	4.80	7.3	6.90^{e-07}	111.80
Openness	1271	-.10	0.19	-1.58	0.65
Size	1074	7.81	10.73	0.21	9.7
Money	421	6.43	1.77	0	9.6
Regulations	401	5.99	1.02	3.8	8.8

***Source**: World Bank’s Development Indicators (WDI), International Country Risk Guide, World Bank, Worldwide Governance indicators, International Country Risk Guide, World Economic forum, Global Competitiveness Report and Economic Freedom of the World Annual report.*

5.4: Econometric Estimation and Results from SFA

Results from the estimation of the production and inefficiency functions are shown in Table 5.7. Before proceeding with the various empirical specifications; we need to report some key features and diagnostics of the stochastic frontier model. Remember SFA allows distinguishing among the following components: technical progress, technical efficiency, and a stochastic component of TFP (Benhabib and Spigel (1994) and (1997)). [42] Using this decomposition we can obtain a measure of Total Factor Productivity (TFP) growth. First, the production function is subject to constant returns to scale (CRS) and all estimated coefficients of inputs represent shares, second the coefficient of the time trend in the production function stands for exogenous technological progress and third the growth rate of total factor productivity (TFP) is defined as the sum of exogenous technical progress plus the growth rate of technical efficiency (*TE*). These are summarised as follows:

1. Input shares, $\frac{\partial \ln Y}{\partial \ln X_j}$ with CRS: $\sum_{j=1}^{3} \frac{\partial \ln Y}{\partial \ln X_j} = 1$

2. Exogenous technical progress, $TP = \frac{\partial \ln Y}{\partial t}$

3. $\frac{\dot{TFP}}{TFP} \equiv TP + \frac{\dot{TE}}{TE}$, where technical efficiency is computed as: $\frac{\partial \mu}{\partial t}$ with μ to represent the mean level of technical efficiency as defined in (5.3).

[42] In growth regression methods of productivity-efficiency estimation, the distinction allowed in SFA is neglected (Koop et al., (1999, 2000), Madden et al., (2001), Wang (2007) and Madsen et al., (2010)). In growth accounting measures (parametric and non-parametric), a production function is specified with identically and independently distributed error terms nevertheless, at the second stage the residual term is assumed to be a function of a number of variables which can be directly entered into the production function as inputs, thus being correlated with explanatory variables. In this case, the assumption of identically distributed inefficiency terms does not hold anymore.

4. Parameter $\lambda = \frac{\sigma_u^2}{\sigma_u^2 + \sigma_v^2}$. This determines whether variation in output is due to noise, $\lambda \to 0$ or distance from the frontier, $\lambda \to 1$

The maximum likelihood (ML) estimates for λ are reported in the lower section of Table 5.4 Values are quite high apart from the first specification indicating that a high proportion of the composite error term in the production function is attributable to inefficiencies. In principle, this signifies that large variations in output can be explained by technical inefficiency and thus from factors that can potentially explain inefficiency, such as institutions. Similarly, the level of technical efficiency across Tables 5.4-5.6 presented in this section indicate that there is a gap from the frontier due to inefficiency that sometimes can reach to almost 50%. These scores of technical efficiency are relatively lower than those found in advanced economies (Christopoulos and Ledesma, 2014). TFP growth rates are also reported based on calculation of formula 4 above.

Table 5.4: Institutions and Human Capital

	(1)	(2)	(3)	(4)	(5)
			Frontier		
lnL	0.422***	0.430**	0.439**	0.410**	0.437**
	(2.60)	(2.51)	(2.49)	(2.26)	(2.45)
lnK	0.521***	0.512***	0.503***	0.454***	0.490***
	(3.34)	(3.11)	(2.97)	(2.61)	(2.87)
lnH	0.057	0.058	0.058	0.136***	0.074
	(1.23)	(1.19)	(1.16)	(2.65)	(1.46)
T	0.035***	0.037***	0.031***	0.032***	0.031***
	(10.43)	(10.56)	(8.52)	(8.77)	(8.51)
			Inefficiency Equation		
Political Institutions					
Rule	-0.231	0.571	-0.129	-0.171	-0.170
	(-1.47)	(1.05)	(-0.86)	(-1.19)	(-1.15)
Pol_stability	-0.433***	-0.272**	0.389	-0.305**	-0.168
	(-3.08)	(-2.12)	(0.83)	(-2.38)	(-1.29)
Gov_effect	-0.187	-0.104	-0.331**	0.301	-0.200
	(-1.41)	(-0.84)	(-2.53)	(0.64)	(-1.56)
Corruption	-0.347***	-0.361***	-0.005	-0.302**	0.346
	(-2.67)	(-2.95)	(-0.04)	(-2.47)	(0.67)
H	-0.002	0.461	0.746	0.494	0.548
	(-0.00)	(0.64)	(1.01)	(0.66)	(0.71)
FDI	-0.048*	-0.036	-0.066**	-0.044*	-0.041*
	(-1.81)	(-1.60)	(-2.52)	(-1.95)	(-1.72)
Openness	2.343	2.778*	3.634**	3.383**	3.019*
	(1.39)	(1.82)	(2.23)	(2.19)	(1.91)
Political Institutions with Human Capital					
H×rule		-0.576*			
		(-1.80)			
H×pol_stability			-0.451*		
			(-1.77)		
H×gov_effect				-0.400	
				(-1.47)	
H×corruption					-0.409
					(-1.35)
Economic Institutions					
Size	-0.161**	-0.210***	-0.171**	-0.207***	-0.185**
	(-2.21)	(-3.05)	(-2.31)	(-2.97)	(-2.57)
Money	0.073	0.073	0.300***	0.106	0.226**
	(0.81)	(0.86)	(3.23)	(1.23)	(2.53)
Regulation	0.208*	0.257**	0.243**	0.245**	0.206*
	(1.75)	(2.28)	(2.02)	(2.17)	(1.76)
Man_share	-0.096***	-0.069**	-0.054*	-0.080***	-0.040
	(-3.16)	(-2.48)	(-1.78)	(-2.92)	(-1.43)
Effort	-0.043***	-0.042***	-0.130***	-0.044***	-0.104***

	(-3.26)	(-3.47)	(-9.33)	(-3.61)	(-7.91)
N	881	881	881	881	881
TE	0.773	0.691	0.757	0.744	0.742
TFP	0.019	0.042	0.029	0.052	0.035
σ_v^2	1.114	1.162	1.194	1.240	1.208
σ_u^2	0.345	0.649	1.086	0.707	0.897
λ	0.310	0.559	0.910	0.570	0.743

***Notes**: t statistics in parentheses with $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$*

Table 5.5: Institutions, FDI and Trade Openness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Frontier								
lnL	0.329	0.326	0.399*	0.319	0.455**	0.417**	0.467**	0.276***
	(1.37)	(1.38)	(1.75)	(1.31)	(2.94)	(2.48)	(3.49)	(16.29)
lnK	0.405*	0.459**	0.471**	0.449*	0.541**	0.543**	0.557**	0.524***
	(1.75)	(2.02)	(2.15)	(1.93)	(3.63)	(3.36)	(4.32)	(26.71)
lnH	0.267**	0.215***	0.130**	0.232**	0.003	0.040	-0.024	0.200***
	(3.93)	(3.22)	(2.02)	(3.39)	(0.07)	(0.85)	(-0.63)	(16.16)
T	0.006	0.005	0.017***	0.003	0.037**	0.031**	0.038**	0.007***
	(1.17)	(1.09)	(3.61)	(0.57)	(11.48)	(8.92)	(13.02)	(4.42)
Inefficiency Equation								
Political Institutions								
Rule_La	1.534**	-0.504	0.296	-2.100**	0.200	-0.183	-0.154	47.777
	(4.12)	(-1.57)	(1.38)	(-2.35)	(1.07)	(-1.32)	(-0.99)	(.)
Pol_Stability	-0.134	1.652***	-0.171	0.967	-0.381**	-0.004	-0.349**	-29.241
	(-0.50)	(3.40)	(-0.84)	(1.06)	(-2.84)	(-0.03)	(-2.51)	(.)
Gov_Effect	0.196	0.009	1.075***	-5.157**	-0.175	-0.233*	-0.054	-44.014
	(0.77)	(0.03)	(4.22)	(-3.42)	(-1.36)	(-1.92)	(-0.35)	(.)
Corruption	-0.553**	0.398	-0.410**	1.497	-0.249**	-0.241**	-0.273**	28.284
	(-2.29)	(1.27)	(-2.13)	(1.20)	(-1.97)	(-2.03)	(-2.04)	(.)
H	0.219	0.943	0.258	0.950	-0.025	-0.014	-0.148	-11.841
	(0.26)	(0.82)	(0.38)	(0.29)	(-0.06)	(-0.03)	(-0.33)	(.)
FDI	0.667**	1.121***	0.664***	1.043	-0.045*	-0.042*	-0.049*	-5.361***
	(4.43)	(4.65)	(5.52)	(1.33)	(-1.78)	(-1.84)	(-1.76)	(-4.00)
Openness	4.269	20.205*	14.696*	13.743	-3.928	-2.218	-1.585	5.790

		**	**					
	(1.45)	(5.95)	(6.21)	(1.27)	(-1.43)	(-0.97)	(-0.55)	(.)
Political Institutions with FDI and Trade Openness								
FDI×Rule	-0.298**							
	(-5.78)							
Trade×Rule					4.162**			
					(2.77)			
FDI×Pol_Stability		-0.378***						
		(-6.14)						
Trade×Pol_Stability						2.481**		
						(2.17)		
FDI×Gov_Effect			-0.278***					
			(-6.72)					
Trade×Gov_Effect							1.908	
							(1.46)	
FDI×Corruption				-0.345*				
				(-1.76)				
Trade×Corruption								11.719*
								(2.26)
Economic Institutions								
Size	-0.461**	-0.442***	-0.322***	0.654	-0.145**	-0.165**	-0.134*	-6.490***
	(-3.29)	(-2.61)	(-3.02)	(1.09)	(-2.03)	(-2.42)	(-1.77)	(-4.51)
Money	0.356**	0.741***	0.457***	0.955	0.128	0.111	0.083	-9.394
	(2.38)	(3.93)	(3.70)	(1.59)	(1.45)	(1.33)	(0.90)	(.)
Regulation	0.702**	0.737***	0.504***	0.843	0.221*	0.205*	0.171	10.314**
	(3.14)	(2.68)	(2.93)	(0.80)	(1.89)	(1.85)	(1.38)	(7.27)
Man_share	-0.154**	-0.230***	-0.161***	0.348	-0.071**	-0.050*	-0.062**	9.902***
	(-3.01)	(-3.43)	(-3.80)	(1.25)	(-2.50)	(-1.86)	(-2.06)	(12.58)
Effort	-0.036	-0.032	0.001	0.415**	-0.081**	-0.053**	-0.067**	-10.813**
	(-1.50)	(-1.09)	(0.04)	(2.92)	(-5.94)	(-4.36)	(-4.47)	(-27.12)
N	881	881	881	881	881	881	881	883

TE	0.600	0.504	0.560	0.588	0.563	0.603	0.778	0.901
TFP	0.01	0.004	0.015	0.004	0.035	0.031	0.051	0.001
σ_v^2	1.634	1.597	1.532	1.637	1.044	1.131	0.902	0.418
σ_u^2	1.700	1.890	1.960	2.350	3.800	3.550	3.550	3.470
Λ	0.510	0.542	0.561	0.589	0.784	0.758	0.797	0.892

***Notes**: t statistics in parentheses $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$*

Table 5.6: Economic Institutions and Trade Openness

	(1)	(2)	(3)
	Frontier		
lnL	0.321	0.386*	0.354
	(1.44)	(1.81)	(1.54)
lnK	0.409*	0.449**	0.415*
	(1.90)	(2.19)	(1.88)
lnH	0.269***	0.164***	0.232***
	(4.27)	(2.73)	(3.58)
T	0.019***	0.018***	0.010**
	(4.11)	(4.14)	(2.18)
	Inefficiency Equation		
Political Institutions			
rule	-0.309*	-0.208	-0.258
	(-1.65)	(-1.23)	(-1.44)
pol_stability	-0.078	-0.190	-0.540***
	(-0.47)	(-1.31)	(-3.39)
gov_effect	-0.429**	-0.451***	-0.444***
	(-2.53)	(-3.02)	(-2.75)
Corruption	-0.217	-0.222	-0.405***
	(-1.37)	(-1.58)	(-2.62)
H	0.969	0.646	0.452
	(1.50)	(1.24)	(0.79)
FDI	0.052	0.033	0.066*
	(1.55)	(1.18)	(1.89)
Openness	3.641*	2.659	3.305
	(1.92)	(1.50)	(1.64)
Economic Institutions			
Size	-0.011	0.068	0.550***
	(-0.11)	(0.82)	(3.25)
Money	1.160***	0.542***	0.512***
	(4.68)	(4.28)	(3.69)
Regulation	0.304**	0.637***	0.562***
	(1.96)	(3.52)	(3.67)
Economic Institutions with Trade Openness			
Openness×Money	-0.192***		
	(-5.94)		
Openness×Regulation		-0.198***	
		(-7.42)	
Openness×Size			-0.201***
			(-6.61)
Man_Share	-0.032	-0.019	-0.075**
	(-0.91)	(-0.61)	(-2.20)
Effort	-0.106***	-0.062***	-0.050***
	(-6.22)	(-4.27)	(-3.15)
N	881	881	881

TE	0.628	0.645	0.651
TFP	0.018	0.024	0.020
σ_v^2	1.529	1.453	1.570
σ_u^2	44.563	4.065	8345.255
λ	0.967	0.737	0.9998

Notes*: t* statistics in parentheses $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$

5.5: Discussion

Technical Efficiency

Appendix Table 5.7 presents average technical efficiency scores for all Sub-Saharan African countries over the period 1970-2010. There is evidence of substantial variation in efficiency levels across countries in this African region. The highest efficiency sore is found in countries located in the Southern part of Africa. (e.g. Swaziland, Botswana, South Africa, Zimbabwe, Lesotho, Nambia, Mauritius, Botswana, and Namibia) than West Africa (e.g. Benin, Burkina-Faso, Coted'voire, Guinea-Bissau, Mali, Niger, Nigeria, and Togo) and Eastern Africa countries (e.g. Burundi, Comoros, Ethiopia, Kenya, Mozambique, Rwanda).

Some preliminary remarks are in order to explain why performance of the Southern-part of SSA is superior. First, many of these economics have adopted open trade policies, which brought export success in primary commodity industries such as: sugar, textiles and apparel. The pattern found in our study is consistent with findings in Sachs and Warner (1997). Second, countries in the southern part of SSA have no substantial mineral resources, which necessitated a significant investment in human capital as well as the design of export oriented policies as paths of economic development. Third, countries located to the south of SSA tend to be more democratic, which might be another part of the puzzle that explains why they persistently perform better.

Production

Regarding estimates of factor inputs across tables 5.4-5.5, labour and capital are positive and statistically significant, as expected. The estimated coefficient of human capital is sometimes insignificant reflecting more likely the low human capital intensity of these countries or the lack of an appropriate institutional environment that human capital can be utilised. These estimates follow a similar pattern with other studies adopting an SFA model in countries with a similar level of development (Henry et al., 2009; Saliola andSeker, 2011; Christopoulos and McAdam, 2015). The estimation of time trend is positive and statistically significant in almost all specifications indicating that there is substantial technical progress that occurred over this long period of 40 years. Finally, the parameter λ tends to be above 0.5 in almost all specifications presented confirming that most large proportion in the variation of output is mainly due to technical efficiency.

Institutions

Turning to the inefficiency equations, a negative estimated coefficient indicates that the variable is a positive determinant of the catching up process towards the frontier thus contributes to a decrease in inefficiency. The autonomous coefficients of political institutions (rule of law, political stability, government effectiveness, and corruption) in Table 5.4 are almost always negative though the level of statistically significance is not always strong. The institutions with the most robust pattern in terms of statistical significance in Table 5.4 are political and corruption. The negative and significant estimate of political stability suggests that a more stable political framework increases business confidence thus stimulating economic activity. In a more stable political environment trade and investment are strongly encouraged, improving the degree of

technical efficiency in national production. The existence of corruption is associated with high transaction costs in economic activities, which prevent an efficient allocation of resources and even more importantly destroys any entrepreneurial initiative. Our results are consistent with Meon and Weill (2008) and Danquah and Quattara (2015), who found that high degree of political stability and minimal corruption, always bring national efficiency.

The results of economic institutions variables in Tables 5.4 and 5.5 show that government size is among the most crucial factors of reducing the level of national inefficiency. The coefficient of the size of government is negative and statistical significance in the 5% level and above in all specifications of Table 5.4 while it is negative and significant in seven out of eight specifications in Table 5.5. The main message behind this result is that the less government intervention in the economy in terms of consumption, taxation and implementation of transfers and subsidies the higher the degree of efficiency. These results imply that the government and more generally public administration in SSA are very likely to be the sources of corruption so their role should be minimal when functioning in the economy in order to keep levels of efficiency. Unlike government size, sound money index is found to be positive in almost all specifications in Table 5.4 and 5.5 even though the level of significance is not always strong in conventional levels. The positive sign represents the necessity of money supply as a means of capturing all potential gains from trade and exchange. High values of this index indicate low inflation and monetary policy that is not used to finance public expenditure. Nevertheless, the financial system in SSA is already under-developed without the presence of many alternative financial capital markets so the lack of appropriate intervention from country's monetary authority can lead to insufficient money supply in the economy that potentially restricts economic activity causing inefficiency..

Finally, regulation has a positive and statistically significant coefficient in all specifications in Table 5.4 and 5.5. Regulation is a composite index that accounts for the degree of economic freedom in three different areas, credit market, labour market and business environment. For SSA countries, the regulation index is constructed using information mainly from credit market as the other two aspects consist of too many missing values. This indicates that liberalisation in the domestic credit market in SSA countries has not brought substantial efficiency gains mainly due to the fact that free market functions are not yet well developed to generate strong mechanisms that will ensure efficient allocation of financial resources. Although market liberalisation has removed restrictions on import quantities and import tariffs, the dysfunctions of the credit market has not allowed traditional export sectors in SSA to exploit benefits from international activities thus overweighing the overall gains from trade and liberalisation.

Institutions and Human Capital

The result of the interaction of Human capital and political institutions as presented in Table 5.4 enhanced efficiency. The most striking feature of this result is that the interaction of the political institution variables with human capital enhances efficiency for all four variables, the rule of law, political stability, government effectiveness and corruption. Our findings indicate that most governments in these countries believe the presence of political stability and strict adherence to rule of law is the key element in the institutional environment that shapes human capital development and improves output per worker. Again, a highly democratic regime is associated with better maintenance of the rule of law (Barro, 1996. 1999), which in turn incorporates a better protection, and enforcement of intellectual property rights and a more rigorous regulation of product safety. Finally, the results also show that improvements in the quality and efficiency of

institutions would reduce the level of inefficiency. It points to a strong impact of quality of institutions on efficient performance in SSA.

Institutions and FDI

Our emphasis in Table 5.5 will be on the interaction terms. The interactions of political institution variables with FDI reduce inefficiency for all the four variables, the rule of law, political stability, government effectiveness and corruption. The importance of this source of external finance is evident in the efforts by many SSA to attract FDI through the adoption of FDI-friendly policies, adherence to rule of and maintenance of stable government. Institutions were recognised as important determinants not only of cross-country differences in wealth and development (Acemoglu& Johnson, 2005), but also of cross-country differences in FDI (Dunning &Lundan, 2008; Pedersen, 2010), they argued that foreign investors have become increasingly aware of the importance of the institutional quality as they make their investment decisions. The continent is abundant in mineral resources, but still attracts only a small percentage of FDI flowing into the developing countries. In 2009, for example, the FDI flows to developing countries amounted to $478.35 billion, in which the share of the whole of Africa was a mere $58.57 billion, representing just 12.2%. (UNCTAD, 2010) Essentially, the lack of infrastructure, institutional policies and political instability are often readily cited, as hindering the flow of foreign investment into the continent compare with other developing economies. However, with the recent improvement in the business climate in the region, most countries have been able to attract more FDI than before. For instance, FDI flows to African countries increased by 5 percent to in 2012 even as global FDI fell by 18 percent (UNCTAD, 2013).

SSA countries that manage to improve their social infrastructure via better governance and high quality institutions also attract more foreign investors making FDI the main engine of growth and

development. These results are in harmony with findings of Hall and Jones, 1999 and Acemoglu et al. 2005 regarding the role of institutions on growth of income per capita.

Institutions and Trade Openness

Our results for trade openness confront prior evidence (Kneller and Stevens, 2006; Mastromarco, 2002) that open countries are more efficient. The interaction of trade openness with political institutions does not provide the expected negative sign in Table 5.5. This finding may well be consistent with the view that the level of trade in SSA is very low, and therefore restricts the region's ability to capitalise on technical efficiency gains from trade. The low level of trade with continuous disruption of production due to strikes and insurgencies in some of the regions limits the absorptive capacity, in so doing, hampering the diffusion of technological improvements and national efficiency scores. In a further test of robustness we investigate whether different type of institutions matter for the exploitation of trade gains. Estimates of interaction variables between trade openness with economic institutions, sound money, regulations, and government size improves efficiency are shown in Table 5.6. Coefficients of all interaction terms are negative and statistically significant at 1 percent level. These results suggest that the synergies in an economic environment between trade orientation and low government intervention, stable monetary policy and a liberalised market environment can lead to substantial benefits in technical efficiency. In other words transfer of technology through trade depends on the degree of economic freedom in the economy. A less distorted economic environment domestically increases the potential for trade associated gains. This result is consistent with those of Griffith et al., (2004), Kneller (2005), and Iyer et al.,(2008) for OECD countries; and (Mastromarco and Ghosh, 2008 and Henry et al. 2009) for developing countries.

5.6: Conclusion

In a stochastic frontier framework, we examine technical efficiency in Sub-Saharan African countries and the role played by political and economic institution, both in determining the position of the frontier and in explaining deviations from the frontier. We found notable differences across SSA countries. These differences are important in understanding growth patterns and productivity in these countries which depend to a large extent on political instability and poor policies. Therefore, Sub-Saharan Africa's poor economic performance (slow growth and aggregate technical inefficiency) can be in part attributed to bad governance.

To our knowledge, this is the first study using a stochastic frontier approach for the entire group of Sub-Saharan African countries for the longest possible time span (1970-2010). Previous studies have considered either the developed or medium-sized, with less restriction.

Sub-Saharan Africa countries are therefore more likely than those in the other regions to reap efficiency gains from trade openness, increase access to foreign capital via foreign direct investment, investments to promote the quality of education and better quality political and economic institutions. From our results, we found that moving towards the production frontier depend upon the market environment and the political and economic institutions of these countries. Sub-Saharan African countries can potentially exploit substantial gains as moving towards higher levels of trade orientation and its manufacturing specialisation. The frontier analysis has also shown the existences of large inefficiencies in the entire sector of most countries in Sub-Saharan Africa. The countries that failed to grow have suffered (e.g., Ethiopia, Rwanda, Madagascar, Sierra-Leone and Mali) high technical inefficiencies.

Our results have important policy implications for sustainable economic development in Sub-Saharan Africa. Development strategy in the future should centre on productivity-enhancing growth. First, technical inefficiencies have significantly retarded GDP per capita growth, which nevertheless suggests ample room for productivity growth through efficiency improvement. Inefficiencies are mainly caused by misallocation of investment, excessive production capacity and the politicized system of rewards. Second, this study suggests that, in addition to purely economic institutions (e.g. trade openness, government size, sound money, regulations); political institutions play a key role in Sub-Saharan African countries efficiency profiles and productivity growth. Policy makers should therefore attempt to improve this key determinant of technical frontier.

The governments of these countries should loosen administrative burdens for trade so that it is easier for manufacturers to export their products and import capital goods. The high cost of importing and exporting, along with lengthy time delays and cumbersome administrative process, makes it difficult for Sub-Saharan African enterprises to increase trade volumes and discourages them from expanding their productive base.

Finally, most governments in these regions (Nigeria, Ghana, South Africa and a host of others) have set up agencies to fight corruption such as the Economic and Financial Crimes Commission (EFCC) and Independent Corrupt Practices Commissions (ICPC), with a sole mandate to fight corruption is a step in the right direction to improve efficiency.

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Appendix:

Table 5.1: List of Variables, Description and Data Source

Variable	*Description*	*Source*
GDP per capita	Real Gross Domestic product per Capita in 2000US$ constant prices	World Development indicators (WDI)
Manufactures Exports	Manufactured goods exports in constant US$	World Bank national accounts and OECD national accounts, UNECA and ADB *database*
Exports' share in Manufacturing(X/Y)	Exports of goods and services as % to GDP	WDI, OECD, UNECA and ADB *database*
Manufacturing Value added	Manufacturing Value added is the net output of all sectors after adding up all outputs and subtracting all intermediate inputs	World Bank national accounts and OECD national accounts, UNECA and ADB *database*
Manufacturing VA (%GDP)	Manufacturing value added as % to GDP	WDI, IMF, OECD, UNECA and ADB *database*
Employment	Labour force share in Manufacturing sector. (Number of Manufacturing workers).	Barro&Lee, WDI and OECD national accounts, UNECA and ADB *database*
Capital stock	Machinery imports.	World Bank's Development Indicators and ADB *database*
FDI	The weighted average net inflows (new investment inflows less disinvestment) as %to GDP.	IMF, World Economic Outlook (WEO)
Rule of law	This variable is intended to capture the extent to which foreign agents have confidence in the rules of the country. It is scaled from 0 to 6, with 0 reflecting the lowest incidence of the rule of law and 6 reflecting the highest.	WDI, WEO(IMF), ADB (Data Base) and UNECA (Data Base), Doing business report, World Economic Forum, Global competitiveness report

Political Stability	Measure the likelihood that government will be destabilised or overthrown by unconstitutional or violent means including domestic violence or terrorism. The index ranges from a scale of 0 (less democratic) to 6 (strongly democratic).	WDI, WEO(IMF), (various issues), ADB (Data Base) and UNECA (Data Base) World Bank, Doing business report, World Economic Forum, Global competitiveness report
Government effectiveness	Measure the quality of public services, the quality of policy formulation and the credibility of the governments' commitment to such policies. It is scaled from 0-6 low scores indicate less government effectiveness and high scores indicate better quality of governance.	WDI (various issues), WEO(IMF), (various issues), ADB (Data Base) and UNECA (Data Base),World Bank, Doing business report, World Economic Forum, Global competitiveness report
Corruption	Measure the extent to which public power is exercised for private gains and the capture of the states by elites and private interest.	WDI, WEO, ADB (Data Base) and UNECA (Data Base), World Economic Forum, Global competitiveness report
Human Capital	% of population with Secondary Education as the highest level attained	IMF, WDI, UNCTAD
Openness to trade (T) (X+M)/Y	This is calculated as the ratio of exports plus imports over Real GDP.	WDI& ADB *database*
Size of Government	This measures the extent to which countries rely on the political process to allocate resources and goods and services. When government spending increases relative to spending by individuals, household and business, government decision making are substituted for personal choice and economic freedom is reduced. The rating is from 0-10; A high rating indicates a greater degree of	Economic Freedom of the World (EFW, 2014 REPORT).

	economic freedom	
Sound Money	Measures the extent to which government finances their expenditures by creating money, in effect, they are expropriating the property and violating the economic freedom of their citizen. The rating is from 0-10; A high rating indicates a greater degree of economic freedom	Economic Freedom of the World (EFW, 2003; 2014 REPORT).
Regulation	Measures the extent to which restrictions into markets, interfere with the freedom to exchange in voluntary exchange, they reduce economic freedom. The rating is from 0-10; A high rating indicates a greater degree of economic freedom	Economic Freedom of the World (EFW, 2003; 2014 REPORT).

Table 5.2: Correlation Matrix

	HC	Open	FDI	Rule	POLS	GOVT	Corrupt	Size	Money
Open	0.11								
FDI	-0.03	0.04							
Rule	-0.03	-0.04	-0.05						
Polstab	0.23	0.07	0.04	0.43					
Govt	-0.09	-0.9	-0.08	0.42	0.40				
Corrupt	-0.04	0.11	0.09	0.08	0.23	0.29			
Size	0.08	0.10	0.07	-0.15	-0.08	-0.22	-0.09		
Money	0.03	0.21	0.16	-0.01	0.19	0.09	0.21	0.20	
Reg	0.31	0.38	0.17	-0.10	0.09	-0.06	0.20	0.24	0.45

Note: All correlations reported relate to averages for the entire period 1970-2010.

Table 5.7: Technical Efficiency Levels in Descending Order

Country	Technical Efficiency
Swaziland	0.995056
Botswana	0.827369
South Africa	0.819459
Zimbabwe	0.767467
Lesotho	0.751106
Namibia	0.740977
Mauritius	0.738947
Mozambique	0.721697
Gambia	0.716206
Cameroon	0.715055
Benin	0.713044
Central African	0.711966
Kenya	0.706614
Zambia	0.704203
Niger	0.701111
Burundi	0.696943
Mauritania	0.682425
Comoros	0.676052
Nigeria	0.675339
Burkina Faso	0.670404
Ghana	0.668593
Cote d' Ivoire	0.667538
Guinea-Bissau	0.665435
Togo	0.663504
Senegal	0.661899
Malawi	0.644375
Mali	0.640575
Sierra-Leone	0.633474
Madagascar	0.631766
Rwanda	0.624274
Ethiopia	0.618938

CHAPTER 6

CONCLUSION

Before concluding the thesis, I would like to state that the analysis of the divergent development paths of Sub-Saharan Africa (SSA) countries is equally important in understanding their growth process. The chief concern of this section has been to apply some analytical thinking to empirical literature on institutions and growth. Some scholars argue that the possibilities of SSA development have been constrained by the lingering effects of the extractive and patrimonial institutions enacted in the region during the colonial period (Engerman and Sokoloff, 2000; Acemoglu et al. 2001a). Glaeser et al. (2004) observe that most indicators of institutional quality used to establish the propositions that institutions cause growth are constructed to conceptually unsuitable for that purpose. The heart of their critique points to the fact that these indicators are not measuring institutions as constraints (which is the key claim of the theoretical literature on institutions), but are actually measuring institutional outcomes or performance. The study argued that, these governance indicators are too volatile to reflect more or less permanent features of the political environment and tend to rise with per capita income.

This thesis can be contested by arguing that a great deal of variation in terms of economic and political outcomes has been actually observed in the region, both across countries and time. It can also be pointed out that the history of SSA levels of inequality (the highest in the world) has their roots in the economic and political structures of the colonial past. We illustrate this by discussing the case of Botswana, Mauritius, South Africa, Sierra-Leone and Togo to buttress our empirical argument in explaining why performance of the Southern part is Superior.

Botswana

Botswana has had the highest rate of per capita growth of any country in the world in the last 35years (Acemoglu, Johnson and Robinson, 2001). This occurred despite that, Botswana did not start out with favourable initial conditions at independence in 1966. When the British left, there were 12 kilometres of paved road, 22 Batswana who had graduated from University and 100 from Secondary School.[43] Botswana is a predominantly tropical, landlocked country surrounded to the south by the Republic of South Africa, to the west and north by Nambia, and to the east by Zimbabwe. It comprises 220,000 square miles (570,000 square kilometers) about the size of France, Kenya or Texas. The environment is mostly arid and 84% of the country is sand, only 4% of all the land can be easily cultivated (which many economists see as a disadvantage, e.g., Bloom and Sachs, 1998).

There is almost complete agreement that Botswana achieved this spectacular growth performance because of good institutions, which we refer to as *institutions of private property*. Despite the large revenues from diamonds, this has not induced domestic political instability or conflict for control of these resources, contrary to other African countries with abundant natural resources such as Nigeria, Burundi, Sierra-Leone, Zambia, Ethiopia, etc. The basic system of law and contract worked reasonably well. The government sustained the minimal public service structure that that it inherited from the British and developed it into a meritocratic, relatively non-corrupt and efficient bureaucracy.

[43] There was no university in Botswana at independence and most of those who acquired even a secondary education were the children of chiefs who attended schools for Africans in South Africa such as the famous Fort Hare College where Nelson Mandela also studied.

Botswana's greatest strengths are its relatively reliable and transparent institutions, efficient government spending, low levels of corruption and its adoption of investors' friendly policies. These policies resulted from an underlying set of institutions- institutions of private property-that encouraged investment and economic investment and economic development. Botswana's institutions of private property reflect a combination of factors:

- Botswana possessed pre-colonial tribal institutions that encouraged broad based participation and placed constraints on political elites.
- It had unusual pre-colonial political institutions allowing commoners to make suggestions and criticize chiefs. The institutions therefore enabled an unusual degree of participation in the colonial process, and placed restrictions on the political power of the elites.
- British colonization only had a limited effect on these pre-colonial institutions because of the peripheral nature of the British Empire.
- Upon independence, there were on civil wars or intense infighting to control the revenues from diamonds across different tribes or groups for control of the state apparatus.

  Finally, the post-independence political leaders took a number of sensible and investors friendly decisions.

Mauritius

When Mauritius became independent in 1968, external observers predicted that the country would experience poor economic performance because of its high population density, reliance on a single crop, and ethnic divisions. When it comes to success in African region, few countries can top Mauritius. Despite its remote location, small size, and ethnic problems, the Indian Ocean country has prospered compared with most other African nations. The 720,000 square-mile is an

African success story borne out in various rankings; first among Sub-Saharan nations in the Rule of Law index from World Governance indicators; first in the Index of African Governance; and the highest ranking African nation in the United Nations' Human Development Index (and No. 81 out of 182 countries worldwide).[44] Between 1970 and 2010, its gross domestic product averaged 5.4 percent annual growth, compared with the African average of about 1 percent.[45]

Mauritius consolidate its leading position in the region this year, benefiting from relatively strong and transparent public institution, clear property rights, strong judicial independence and efficient government. The Island was able to adapt (to external shocks) with business-friendly policies that allowed its economy to continue to diversify and thrive. This accomplishment suggests at least three possible lesions for the rest of Africa.

- First, trade is crucial to growth.
- Second, ethnic difference can be accommodated by a well- designed parliamentary political system.
- Thirdly, democracies can reform economic system in ways that foster economic growth.

South Africa

Though South Africa achieved independence from Britain on 31 May, 1910, Freedom day is the official Independence Day of South Africa. It is celebrated on 27th of April every year and commemorates the first democratic, non-racial elections held in 1994. South Africa is one of the African countries (Angola, Mozambique, Namibia, and Zimbabwe) that gained their independence only after waging war against their colonial masters. South Africa is a multi-ethnic

[44] See World Economic Forum: Global Competitiveness Report 2014-15
[45] See comprehensive survey of the evidence in Jeffrey Frankel (2014), Mauritius: African Success Story (NBER Working Paper No. 16569).

society encompassing a wide of variety of cultures, languages, and religious. Its pluralistic make up is reflected in the constitutions, recognition of 11 official languages, which is among the highest numbers of any country in the world (South Africa Fast Facts, 2007).

In South Africa there was large scale European migration, the exploitative structure of the colonial economy was very evident. In the apartheid regime of South Africa, no African was allowed to own property or start a business in the European part of the economy. It is not surprising that black Africans were uneducated; the South African state not only removed the possibility of Africans benefiting economically from education, but also refused to invest in black schools and discouraged black education.

Despite the difficult era of apartheid in South Africa, the post-apartheid period has been more successful for the country. South Africa has a mixed economy, the second largest in Africa after Nigeria. It also has a relatively high GDP per capita compared to other countries in Sub-Saharan Africa ($11, 750 at PPP as of 2012).[46] There have been four post-apartheid presidents in South Africa but the regime of Nelson Mandela, took a number sensible decisions.

- Mandela professed himself to be humble agent acting on behalf of South Africa. His style of leadership allowed a participatory democracy to take root in South Africa.
- South Africa's emphasis on civic nationalism, equality, and democracy has afforded greater opportunity for peace, political stability, and economic success.
- Despite South Africa's rising crime levels and recent experience with, Xenophobia, it is undisputable that South Africa remains one of the continent's most successful democratic post-colonies.

[46] Human Development Report (2007-2008).

- South Africa's constitution limits presidents to two-five year terms. Participatory democracy remains South Africa's strongest asset in ensuring a strong political voice for the country.

Sierra-Leone

After achieving independence from Britain in 1961, Sierra-Leone enjoyed only a brief period of free and competitive democracy. Increasing political instability, worsening governance and deepening poverty marked the subsequent few decades, which terminated in institutional collapse and civil war.[47] The country was ruled by authoritarian leaders who enriched themselves through illicit deals involving diamonds. The government of President Isiaka Stevens dismantled competitive democracy and declaring the country a one party state in 1978. By early 1990's, Sierra Leone had the second lowest living standards of any country in the world (United Nations 1993).

The weak economic performance and poor governance of the 1970's and 80's steered the country towards civil unrest. Partially as a result of the widespread discontent towards the corruption and ineffectiveness of government a small group of rebels, who had entered the country from Liberia in 1991, were successful in recruiting disenfranchised youth to rise up violently against the status quo. These rebels known as the Revolutionary United Front (RUF) spread the armed conflict to all parts of the country. The brutal civil war that ensued saw an estimated 50,000 Sierra-Leoneans killed, over half of the population displaced from their homes, and thousands of civilians victimized by amputation, rape and assault (Human Rights watch 1999). A small cadre of British troops, along with a large international peacekeeping mission, brought the war to a decisive end with peace officially declared in January 2002.

[47] Sierra-Leone had a civil war from 23rd March 1991 to 18th January 2002, between the Revolutionary United Front and successive governments.

From the foregoing analysis, there are a number of explanations why Sierra Leone does not have good institution after independence.

- The British introduced a system of "Indirect Rule", where local government administration was delegated to the Paramount Chiefs (PCs) who collected taxes and administer justice.
- The Paramount chiefs (PCs) are elected for life and to be a candidate one must come from a ruling family or ruling house. In practice, establishing today that a particular family is a ruling house is done by showing that an ancestor of the house was allowed by the British to contest to the PC.
- There is no formal or written list of ruling house, the set of acceptable linkage is entirely "local knowledge", and the respect for the system never really be institutionalized.
- Sierra Leone emerged from the war in a very weak position economically, socially and politically. The country remained at the bottom of the United Nations Human Development Index ranking (183) as at 2014.
- Colonial rule enhance the historical legacy of inequality between local chiefs and their subjects. The PCs have autocratic power over their subjects, thereby exacerbating inequality and reinforcing social divisions.

Togo

Togo (although was first colonized by Germany) with French colonial history is a relatively small, poor West Africa country has a long post-colonial history of military rule. Togo, long time ruler Gnassingbe Eyadema and his supporters, managed to block the introduction of democracy in the

early 1990s, after initially yielding for pressure to institute a multi-party system.[48] The Togolese courts are also heavily influenced by the ruling regime, freedom of assembly has not been present and there has been extensive government control over the media.[49] Togo has thus suffered a high degree of democracy which has resulted in long economic stagnation in the region. For instance, Benin and Togo are small West African neighbours, with a relatively similar ethnic fragmentation structure, a post-colonial history of military rule and even a shared currency (CFA). In terms of PPP-adjusted income, the picture of the divergence is even clearer, an average Beninese was 30 percent wealthier than a Togolese in 1990. In 2008 however, he or she was 77 percent wealthier. The PPP-adjusted GDP per capita of Benin in 2008 was 1357USD, compared to 765USD in Togo.[50]

Despite the growing interest in studying the relationship between the roles of foreign direct investment, institutions, output efficiency and their implications for economic growth, there has been little attention in economic literature with reference to Sub-Saharan African Countries. This thesis has tried to fill this gap by exploring various phases of the interplay between this relationship and their implication for the growth of Sub-Saharan African economies.

To achieve this aim and to verify this argument, the thesis was designed to include three empirical chapters in addition to three other chapters; one for the introduction, a brief overview of Sub-Saharan Africa and the last for the conclusion. The first empirical chapter studied the relationship between FDI and economic growth, the second empirical chapter explored the role of institutional quality in determining output per worker, and the last empirical chapter studied the role of political and economic institutions on national efficiency.

[48] See e.g. Bratton and Van de Walle 1997
[49] Freedom House 2008b
[50] See Knutsen (2009), Africa's Growth Tragedy Revisited: Weak States, Strong Rulers.

6.1 Summary of the Findings

The main results of this thesis can be summarised as follows.

The first empirical chapter showed that there is a strong complementary between FDI and domestic capital and trade openness, which promote economic growth in SSA economies. Again FDI not only directly promotes economic growth by itself, but also indirectly does so via its interaction terms.

The study finds FDI in SSA has served as complement to domestic firms, rather than crowding out domestic investment, FDI is found to be complementary with domestic investment.

The study provides evidence to the proposition that the ability to absorb the advantages embodied in FDI is conditional on the capability of the host country with respect to human capital and the level of infrastructure. The findings confirm that certain SSA economies do not satisfy the threshold education and infrastructure levels and hence these countries need to invest more in education and infrastructure.

The study finds that the economic nature of the host country is an important determinant of FDI inflows into this region. Trade openness exerts significant influence on FDI inflows. And again, there is a strong positive interaction effect of FDI with trade openness.

And finally, the study cannot conclude that FDI has a different effect on mineral-rich countries than it does in mineral-poor countries.

The results obtained from the second empirical chapter provides evidence that international differences in output per worker are best understood using Solow model augmented with Human capital and Institutions.

The study finds that aside from investment in physical capital accumulation, and human capital, the institutional profile exerts a strong effect in determination of output per worker in SSA economies.

The study finds that government effectiveness, political stability, rule of law matters for determination of output per worker. But the same cannot be said of control of corruption and regulatory quality.

The study finds that FDI alone exerts a positive effect on output per worker. This suggests that FDI is an important vehicle for the transfer of technology.

The study provides evidence that institutional quality in host countries is also important determinants outputs per worker. More importantly, workers are able to do better in the economy where there is a sound rule of law, less corruption, more political stability and less social tension.

The third empirical chapter showed that in addition to purely economic indicators (e.g., Sound money, Government size, Trade openness, Regulations, FDI), Political institutions (Rule of law, Political stability, Government effectiveness, and Corruption) play a key role in determining how close SSA countries are to the production frontier.

The study finds the level of technical efficiency across Table 5.4-5.6 presented in this section indicate that there is a gap from the frontier due to inefficiency that sometimes can reach to almost 50%. It can be concluded that Sub-Saharan Africa's slow growth can in part be attributed

to a large difference among aspects of political and economic institutions in influencing technical efficiency. The continent is growing slowly not only because of geographic misfortune and lack of integration with the global but also due to the prevalence of malfunctioning institutions.

The study finds that Human capital (education) has enhanced efficiency in a strong and pervasive manner. This suggests more educated workers are able to implement advanced technologies.

The study finds that FDI has enhanced efficiency in SSA economies. This suggests that FDI is an important vehicle for the transfer of technology. Again the interactions' of political variables with FDI reduce inefficiency.

6.2: Limitation of the Study

Though the results are quite plausible and meaningful, the study is quite conscious of the data limitations in Sub-Saharan African countries and the need for further work in this area.

At various stages, the basic objective of the study is suffered due to inadequacy of time series data from related agencies. There has been a problem of sufficient homogenous data from different sources.

For the first empirical chapter (chapter One), future studies should delve into sector specific effects of FDI (Natural resources, Manufacturing and Services) this will assist policy makers in the direction of FDI require.

Disaggregated FDI data will permit research that estimates FDI effectiveness by sector. This will equip governments with the information necessary to establish policies that channel FDI to appropriate sectors of the economies. The World Bank and United Nations should do more to improve the data availability in SSA.

In the second empirical chapter (chapter Four), we observed an important issue that most countries in the region do not have comprehensive data as other region in the Penn World Table use for our analysis.

Again, the table has long been a data source, widely used to compare output growth and living standards across countries. Yet the data have also come under criticism. The new versions of the tables can sometimes radically change the rankings of country growth and overturn the existing results in the literature.

For, the third empirical chapter (chapter 5), the Economic Freedom of the World Indicators have been reported every five years and some countries again in SSA have missing values. Seychelles, which is a country in our sample, was not reported.

Finally, future studies should endeavour to look for other variables that can still be crucial to technical inefficiency in SSA.

6.3: Policy Implications

A number of policy implications can be drawn from the analysis and findings of the thesis.

Policy makers should, invest more in the development of infrastructural facilities and the road network that can link all this country together and regulate the inflows of foreign direct investment.

Policy focus should be directed at attracting FDI in those sectors that can lead to long-run economic growth, in particular the manufacturing sector. Government must target at attracting specific types of FDI that are able to generate spillover effects in the overall economy.

Specific policy aimed at promoting human capital development through higher secondary school enrolment should be designed in a bid to spur rapid economic growth in the long-run. Sub-Saharan Africa has one of the world's lowest adult literacy rates, with only 60% of the population of 15 and over able to read and to write in 2000, well below the world average of 80%. The figure was below 40% in Benin, Burkina Faso, Ethiopia, Gambia, Guinea-Bissau, Mali, Niger and Senegal.

Employment by Multinational Corporations (MNCs) is one of the most effective ways by which FDI can reduce poverty and improves economic growth in host countries. MNC employment

increases domestic employment, boosts domestic wages, enhances the productivity of the labour force and it fosters the transfer of technology between foreign and domestic firms. Again MNCs pays higher wages than domestic firms and the presence of multinationals generate wage spillover: wages tend to be higher in industries and provinces that have a greater foreign presence (Asiedu, 2013). The government should ensure that more labour force is gainfully employed in MNCs.

The recent pattern of FDI flows to SSA countries has been towards the oil sector, this sector is often an enclave sector with little backward and inward linkages with other sector. The economies could benefit by attracting more FDI in high technology industries.

SSA countries should have regional economic cooperation; this may facilitate FDI to the region. The market size advantage of regionalism is particularly important for Africa because countries in the region are small in terms of income. With regards to income, about half of the country has a GDP of less than $3 Billion. Indeed, the total GDP of SSA in 2009 was $956 billion, which was about equal to the GDP of Mexico and about 61% of GDP of Brazil (WDI, 2011).

Policies should be designed to open up their economies to trade, in order to boost the stock of R&D, via the increase in access to foreign capital. Trade openness, not only promotes a more efficient allocation of resources, but also opens the door to technological diffusion from abroad, and undermines local monopolies. A small number of Sub-Saharan economies adopted open trade (Botswana, Mauritius, and Swaziland, among others) by the early 1970s. These economies have out-performed the rest of Africa by a wide margin. More recently, other economies from West Africa (Nigeria, Ghana, Senegal, Togo, Mali, and a host of others) have begun to liberalize trade and reorient towards export-led growth.

Efforts should be directed at improving good governance and minimizing, if not eliminating, corruption and other forms of inefficiencies within the public sector so that the negative effects of excessive government spending on long-run growth would be reduced. Countries in SSA should take a cue from Nigeria, Ghana, South Africa and a host of others that have set up agencies to fight corruption such as the Economic and Financial Crimes Commission (EFCC) and Independent Corrupt Practices Commissions (ICPC), which is a step in the right direction to improve efficiency.

SSA countries, should pay more attention to exporting of their natural resources and agricultural products, this is not to suggest that they should not pay attention to industrialization. Exporting is associated with static gains that include access to large outside markets, hence exploiting economies of scale. There are also dynamic gains that include efficiency advances as a result of knowledge and technological spillovers from exporting experience.. Exporting is also associated with efficiency in resource allocation, employment generation, and relaxing of the foreign exchange constraints.

Again, reforms in these economies should therefore attempt to improve the political and economic institutions, which are the key determinants of the technical frontier.

Finally, the health deficit in Sub-Saharan Africa needs to be addressed through a combination of enhanced social policies (e.g. improved primary health care and education for rural Africans), as well as increased scientific efforts to control or eradicate major tropical diseases such as malaria and the recent EBOLA outbreak in the region. All these worsened efficiency and lowers output per worker.

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